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September 25, 1930

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By V. R. Covell and P. J. Freeman

## Mexican Highways—the Backbone of National Development

By Wallace Thompson

## The Theory of Mechanical Stress Analysis

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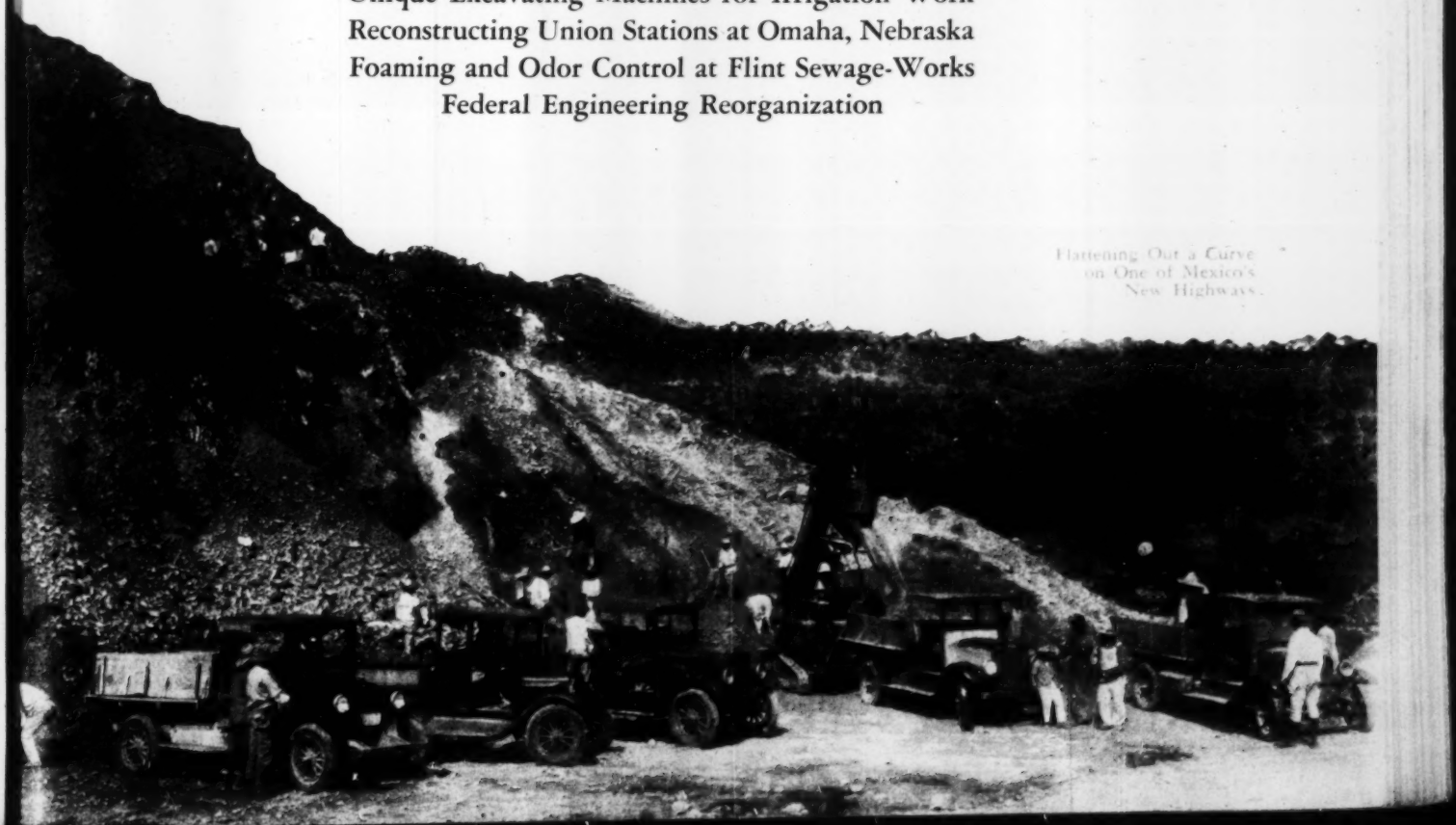

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# ENGINEERING NEWS-RECORD

A McGRAW-HILL PUBLICATION — ESTABLISHED 1874

DEVOTED TO CIVIL ENGINEERING AND CONTRACTING

F. E. SCHMITT, *Editor*

Volume 105 NEW YORK, SEPTEMBER 25, 1930 Number 13

## *Public and Private Initiative*

THE high peak reached by public-works construction during the current year gives particular interest to news indicating that the volume of public contracts will remain high for some time to come. New projects just scheduled by a number of states and cities promise to do much toward keeping up the present rate. This active prosecution of necessary construction is eminently wise on the part of the public and public officials. The exceptionally low cost for construction and building means that the taxpayer's dollar now will produce a larger result than in periods of swiftly moving business and high prices. In contrast to the general trend, however, comes a report from Akron, stating that the city council has abandoned its plan to submit a $3,000,000 sewer bond issue at the November election; the sewer is needed, it appears, but the councilmen fear that the referendum would be lost by the psychological effect of depressed business and employment. Such timid action seems of doubtful wisdom; investment in proper development improvements at this time is profitable. And this argument applies as fully to utilities and industries as to cities. Provision for industrial requirements of the next year or two by contracting now is likely to return good dividends.

## *Good Work*

WITHIN a week the lower Fifteen Mile Falls power plant on the Connecticut River will be put into service. Work has been under way for only a trifle more than two years. In that time a concrete dam 175 ft. high was built, also a retaining wall of the same height, the largest ever attempted in the world's history, an earth embankment to extend the dam to the New Hampshire bank, and a power house of something more than 50,000-hp. capacity. The rapid construction, fully on schedule, typifies the achievements in speedy construction that have been made possible by thorough planning and that are gradually becoming the normal requirements of construction operations. It was realized at the start of the Fifteen Mile Falls work that money would be saved by putting this plant into operation at the earliest possible date, since lost earnings during construction do not help to pay interest and dividend charges. What is true of a power plant is true also of other kinds of construction—a railroad, a shipping pier, or a city office building. By virtue of thorough appreciation of this fact, present-day construction is attuning itself to a speed never before thought possible, and constructors are meeting each new requirement with respect to time that is imposed upon them. The remarkable performances in office-building erection to which we referred only a few weeks ago have their parallel not only in hydraulic construction but also elsewhere in the construction field. Work at high pressure pace, at one time believed necessary only in a few specific types of operation, as tunneling, has become rule and requirement. Largely through its aid the contractor's art is lifting itself to new levels of performance and ability.

## *Lakes as Airports*

NEW JERSEY has opened a new field for contention by forbidding the use of its inland lakes to aircraft for landing purposes. This action is based upon the great hazard created by high-speed seaplanes in maneuvering upon waters already crowded with small boats. The reality of the danger cannot be questioned, but the ruling itself raises interesting questions which must ultimately be settled by the courts. Since ownership of these waters rests in the state, as custodian for the general public, is it reasonable regulation of use for the state to forbid their use by the air-minded section of the public? Has a seaplane the right to land on any public water, regardless of danger to surface craft? Will such a ban act as an interference with interstate commerce, and thus bring the federal government into the picture? Air transportation is so new that its rights, where they conflict with those of other forms of transportation, are still uncertain. Also, the hazards which it creates have not yet been fully appraised. New Jersey's action will help to bring clearness into these matters. It will surely be attacked in the courts; the outcome will be both interesting as a solution of the immediate problem and important as a precedent in other cases.

## *Twelve-Month Construction*

THE theory that concrete construction must cease with the first signs of freezing temperatures has been proved false time and again. During the past few seasons, the companion theory that winter construction, while feasible, is prohibitively expensive has also lost caste. Additional evidence of the reasonable cost—and in this instance marked economy—of concrete construction during the winter months is presented in this issue in an article on the new Ohio River Boulevard bridges in Allegheny County, Pa. By resorting to early-strength cement with attendant short curing periods, to tight forms, heated aggregates, warm water, a heated mixer and 48-hour steam curing, 60,000 cu.yd. of concrete was placed in five arch bridges while the average air temperature was 29 deg. The job was completed 220 days ahead of schedule, with important savings in overhead expenses and interest charges. The economy in early opening of the boulevard will be no less real. The work described was done last winter, but it is now more timely than ever. Once more winter is not far away, and the question of building now or waiting until spring is in the minds of many executives. Having successfully

waited until rock bottom was reached in materials and labor prices, they should not balk at the necessity of winter construction, for twelve-month construction has demonstrated its practicability and economy. Construction during the winter of 1930-31 holds greater promise for economy than will construction next spring, when higher costs are probable.

### *Open Roads*

SOME 200 miles of road in the Province of Quebec are to be kept open for motor traffic this winter. This will be the second year in which the provincial highway department co-operating with the municipal government has kept trunk highways open between Montreal and Quebec and United States border points, the municipalities paying $100 per mile for work within town limits. Two years ago the Royal Automobile Club, co-operating with other traffic interests, managed to keep the main road between Montreal and St. John, New Brunswick, open for traffic the greater part of the winter. Consequently, the coming winter will be the third in which such work has been carried out in the Province of Quebec. In opening winter roads the province is following the lead of several states in this country and some of the other Canadian provinces, a work begun in regions of relatively light snowfall and gradually pushed farther north until now it is carried right into the heart of a region where a few years ago it was believed that the abandonment of automobiles and motor trucks during the winter months was as inevitable as the coming of winter itself. The heavy snowfalls in the St. Lawrence Valley make the problem of the Quebec highway department a particularly difficult one. Last year the highways were temporarily blocked after unusually severe storms because the organization for attack had not been perfected and snow was allowed to accumulate until nothing remained to be done except to dig out the drifted section by hand. This year better results are hoped for. The lesson learned there as elsewhere is the same one long ago learned by railway operating men, that the only way to keep a road open is to start plows moving as soon as the snow begins to fall and keep them moving until snow ceases to fall. Open roads in winter cannot be had without considerable expense and efficient organization, but wherever the work has been attempted it has been found worth the price.

### *Imaginative but Useful*

THE design for a mile-high tower of structural steel which Gilbert Fish explained at a New York section meeting of the American Welding Society last week will prove useful in spite of its highly imaginative character. Already it has given rise to numerous discussions in the press. By the time the psychological, sociological and even biological experts, together with others afflicted with a chronic desire to foretell the future, have finished, Mr. Fish probably will find himself far outdistanced in the use of imagination. For the present, however, he has done structural welding a needed service and at the same time made more definite the fact that building heights are in no way restricted by materials of construction or design ability. Welding on tall tier buildings, as we pointed out last week, needs a champion. Its one attribute of noiselessness has been put forward almost to the exclusion of other possible advantages, and in consequence some feel that welding should be confined to "structures of medium height where no wind stresses are involved." Mr. Fish, in common with many other engineers, feels that such definite wording in a building code would be unfortunate. One can go farther, and state that it would be unfair and show lack of foresight. As Mr. Fish pointed out, welded connections can be made of almost any strength desired; they can be made to develop the highly concentrated resistance so important to wind connections in buildings where wall space must not be filled with structural members; they can be made rigid enough to take advantage of the economies of continuity in design. His statement that it is easy to prove field welding costs less than field riveting is not so easy to take at face value. Costs, on the other hand, have no bearing on reliability of structural welding practice. The proposal, if it has attained the dignity of a proposal, to limit the scope of welding by code requirement should be wholeheartedly opposed.

### *Man Steps Upward*

ONCE again man has erected a structure surpassing in height any previously built by his fellow beings. Last week the main frame of the Empire State Building in New York was topped out, 1,048 ft. above the street, 2 ft. higher than the tip of the Chrysler Building spire, the former record skyscraper. It is idle to speculate as to the possible maximum height of man-made structures. Development of high-strength metals and lightweight types of construction, and steady improvement in vertical transportation, are surmounting obstacles once thought to limit skyward progress in building construction. Although the builders of the Empire State Building are rightfully basking in the glory of a new and spectacular accomplishment, their achievement bids fair to be overshadowed at no remote time. For man is refusing to accept any limitations in his ability to build away from the earth.

## *New Activity in Coast Protection*

ORGANIZATION of a federal engineering board to study coastal erosion and coast protection, just announced, is a step of great promise. Coastal erosion is an important element of the vast leveling process that is unceasingly cutting away the earth's surface and seeking to flatten it to a uniform plain. Like moving water everywhere, wave and tide are inherently destructive agents, ever loosening, dragging down and shifting the solid materials along thousands of miles of our coasts. Coastal action is predominantly attack. Yet study of this action is still highly backward.

Perhaps for this reason little constructive public attention has been given to the subject. Only Massachusetts and New Jersey of our twenty-one seacoast and eight Great Lakes states are active in coast protection work. The national government's concern with the subject has been incidental. Cities, counties and private individuals affected have had to work unaided, where they were willing to attempt any defense at all against the sea's aggression.

The War Department now has set up, under recent congressional authorization, a board of able military and civil engineers to conduct a systematic study of coastal erosion and coast protection. Its work will be the first directed attack on the problem, and though doubtless slow in producing results it is sure to give us better

guidance in due time. It calls for the warmest support and widest possible co-operation. Every item of coast work is a large-scale practical experiment which through the board's study can be made effective in furthering knowledge of how to protect and stabilize shore lands.

Simultaneously there comes another item of constructive news, to the effect that New Jersey's Board of Commerce and Navigation, which already has spent large sums on effective coast-protection works, recognizes its problem as so large and urgent that it will seek greatly increased funds from the next legislature. Its completed work, as well shown in an inspection tour last week, demonstrates the need for extensive co-ordinated construction if results of greatest effectiveness and economy are to be obtained. As the value of coast protection has also been amply demonstrated—especially in the serious losses sustained by sections of the New Jersey coast where shifting and swinging of the shore line is most extensive, and by the reduction or elimination of these losses through the construction of protective works—the claim for larger expenditure is strong and substantial.

More than two dozen states have still to act upon their sea or lake shore problems. Since much of their most valuable land lies exposed to coastal erosion, the direct interest of the community in systematic protection work is beyond question. Now that co-ordinated study of the problem has been organized, there is good reason for this interest to become more articulate and to bring about state action in all the regions concerned.

## *Sowing the Wind*

A STEP that throws the management of a large and responsible public undertaking into the whirlpool of petty politics is questionable on its very face. When it threatens the very fundamentals of a sound and stable road-building program, with its extensive involvement of local issues, continuity of plan and intensely technical character, it must be written down at once as inviting disaster.

Arkansas is preparing to vote on a constitutional amendment which will make the state highway commission elective. The commission now is appointive. Members are named by the governor in rotation, so that at all times the main body of the commission is made up of experienced men, familiar with problems and policies. Commissioners can be selected for their ability and public spirit, and without regard to their political party services, their local commitments or their hopes for the next election. The new plan would change all this fundamentally. The entire commission is to be elected every two years, each congressional district electing one commissioner. They in turn are to choose the engineer to direct the highway work.

Bare statement of the plan is enough to show its evil character. The very nature of the proposed arrangement spells incompetence, instability of purpose, abandonment of the great highway fund and organization to political spoliation, and the destruction of basic plan by logrolling to win local favor. If these results were specified in the amendment they would not be more certain. The picture is made more graphic by the salary specified for the highway commissioners, $2,000 a year, which reflects the type of commissioner and type of organization which the change of method will produce.

If it adopts the pending amendment, Arkansas will be sowing the wind. The whirlwind will unfailingly follow after.

## *Wage Rates Survive the Depression*

WAGES have held up this summer despite unemployment. That is one of the most notable facts of the business depression just ending. Commodity prices came down materially, as had the cost of living, but with few exceptions little attempt was made to pass losses along to wage earners and thus reduce their purchasing power by forcing them to accept lower wages as an alternative to unemployment. By many this development is considered to be a most significant factor of the present time, an indication of definite change in the attitude of capital toward labor.

A few weeks ago this journal made a survey of wage conditions in the construction industry. The results were published in our issue of July 10. They showed no general reduction of wage scales, but disclosed instances in which skilled men were voluntarily accepting wages below their normal rate without any change in the rate itself, and instances of men working shorter hours at the standard rate of wages. More recently *Printers Ink* put the question of wage reduction to leaders in a number of diversified industries, asking whether they had made wage reductions or contemplated doing so. With few exceptions the men addressed expressed themselves as opposed to wage reductions. Their views may be summed up in those expressed by George F. Johnson, of the Endicott-Johnson Company. He said: "Reducing income of labor is not a remedy for business depression; it is a direct and contributing cause."

A few replies were in a cautious vein, showing recognition of the soundness of such views as those of Mr. Johnson but uncertainty as to whether normal wages could long continue under depressed business conditions.

That such a general cut will come is not to be expected. The season's developments and the stability of wage rates up to and through the fall revival give substantial assurance that the great mass of employers and workers alike stand firmly against a policy of lowered wage rates. Even a few notable cuts, as one in the Chrysler automobile plant, were unable to precipitate a general reduction, and since then the calling back to work of thousands of men by the automobile industry supported the conditions of stability in that quarter. Now, with production and commerce trending upward, the chance of any basic change is made still more remote. With fair-weather signals in view, the industrial leaders who have held out against change will not capitulate now.

This situation is of utmost weight in its bearing on future price trends and business policies dependent upon them. The general level of market prices is low—effectively at rock bottom—creating a favorable market for purchase and construction. Labor efficiency has improved in noteworthy measure, supporting the reduced price level and bringing bid prices and construction costs to a highly attractive point. Were wages to decline, a further reduction of costs might be looked for. But in the face of all the evidence for maintained wage rates this contingency is out of the reckoning. It would indeed be a decidedly unfavorable development, one almost certain to demoralize business conditions.

These facts emphasize the views which we presented a week ago. They characterize the present time as exceptionally auspicious for construction, when commodity prices are low, labor efficiency high, and bidding is keen and close. Further economies through wage reductions are not in prospect. Wage rates survive the depression.

# Winter Construction of Concrete Bridges on Ohio River Boulevard

## Winter Expedients and High-Early-Strength Cement Enable $5,000,000 Boulevard With Nine Bridges in Allegheny County to Be Completed 220 Days Ahead of Scheduled Date

By V. R. Covell and P. J. Freeman

*Chief Engineer, Bureau of Bridges, and Chief Engineer, Bureau of Tests and Specifications, Allegheny County Department of Public Works, Pittsburgh, Pa.*

CENTERS AND ARCH-RIB FORMS, DILWORTH RUN BRIDGE

THE Ohio River, from its beginning at the junction of the Monongahela and Allegheny rivers, flows northwest for a number of miles through a narrow valley with steep hillsides deeply recessed by small intersecting gorges accommodating smaller fast-flowing streams on their way to the Ohio. The hillsides forming the north side of the valley are built up throughout a distance of about ten miles from the source of the Ohio. Through this urban portion of the valley, a narrow and in many places a very indirect thoroughfare must accommodate all traffic. These conditions have resulted in severe traffic congestion, due to the narrowness and poor alignment, that has demanded a more modern highway.

Last year the voters of Allegheny County authorized their county officials to proceed with this work by providing a necessary bond issue. Surveys were rushed to completion and a road 19,000 ft., or about 3½ miles, long was located. Practically 75 per cent of the location passes through private property. Nine bridges must be constructed, and among them are five reinforced-concrete arch structures. Four arch spans are 150 ft. in length, three of which form a multiple-arch structure over Spruce Run. One arch has a span of 180 ft., another a span of 219 ft. and the fifth, over Jack's Run, has a single span of 400 ft. For a span of 150 ft. the rise is about 38 ft. and for the 400-ft. span the rise is 86 ft. Each arch is designed with two ribs, the depth of which at the crown is 3 ft. for the 150-ft. span and 8 ft. for the 400-ft. span. In addition to these structures, there are also four steel girder bridges of short spans. About 66 per cent of the cost of the work will be for bridge construction.

The contract was awarded late in July, 1929, and work was begun Aug. 19, 1929, the bridge work being begun at the earliest possible moment because (1) a large yardage of concrete was required in foundations, all of which in any event could safely be placed during the winter; (2) it was very important that the bridges be completed as early as possible to permit immediate completion of the approach fills and thus allow proper settlement before the paving work should begin in 1930; and (3) the project is so spread out that adequate supervision and control of both bridge and road work would be very difficult and costly if all the specialized phases of this work were under way at the same time.

With nine bridges to erect, a definite order of procedure was set up. The smaller bridges with steel girder construction were built first. This construction was not difficult, since no unusually large or specialized equipment was required.

The program for reinforced-concrete arch construction required the building of the open approach spans and decks first. The arch ribs were then placed with the approach deck spans available for stiff-leg derricks having 150-ft. booms. One derrick at each end handled the forms and placed the concrete in the arch ribs, spandrel columns and decks. One mixer was stationed at each end of the bridge and located conveniently for the operation of the derricks. At Spruce Run and Jack's Run, cableways were used because of the long multiple-arch structure at Spruce Run and because of the 400-ft. span at Jack's Run.

The cableway at Spruce Run, with supporting towers and anchors, was first erected. It had 2¾-in. steel cables and was used to place the steel centering and forms and also to carry the 3-cu.yd. concrete buckets. The cables were so cut and the supporting towers were so built that they could be transferred to Jack's Run with practically no alteration.

### *Forms and Centering*

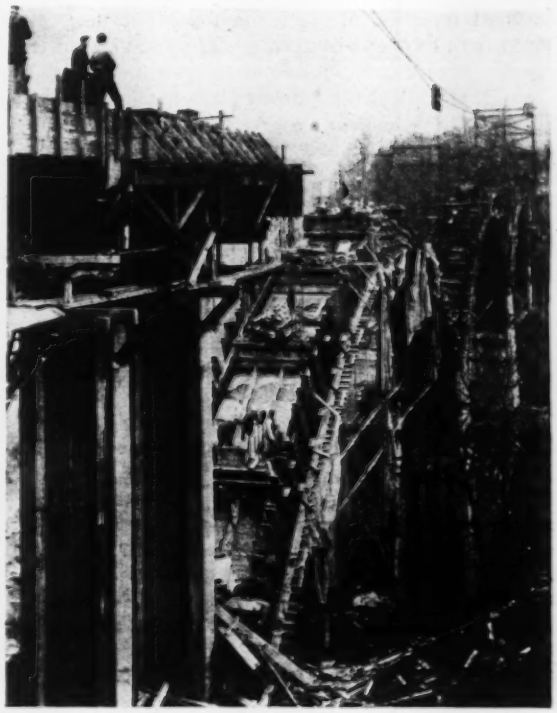
The forms for the arch ribs and spandrel columns were designed to be transferred practically without modification from one arch structure to the one next built. By slight modification which was quickly affected, the steel centering was also built to permit of the same interchange. The 400-ft. arch span over Jack's Run was planned to be constructed last and to use all of the steel centering forms used on all the other arch bridges. The true contour of the intrados of the arch was to be secured by the use of additional formwork or centering, supported by the steel trusses.

The arch-rib forms were built especially tight. Three-ply, ¼-in. veneer board was used to cover 4x4-in. lagging, spaced 6 in. c. to c., and served as the intrados surface form. The side forms were made of 2-in. tongue-and-groove lumber. All seams and cracks were carefully filled with sawdust and glue. Form oil was then applied. These precautions proved adequate insurance against leakages and gave a dense concrete surface, thereby adding to durabiity by guarding against disintegration due to moisture absorption followed by freezing and thawing.

### *Winter Concreting Plan and Methods*

To safeguard and facilitate winter concreting, a 2,000-ton bin for gravel and sand was erected in which 1-in. perforated steampipes were placed at an angle of about 45 deg. upward. The aggregates were transferred by a crane and clamshell bucket from river barges to stockpiles and to heating bins. A 230-ton steel bin, for measuring and loading, was erected underneath and received materials by gravity from the 2,000-ton bin. The total cost of heating the aggregates, including the operation of a boiler and all incidentals, was approximately $25 per day for a daily run of about 400 cu.yd. of concrete.

As a result of an economic analysis made by the contractor, he found it advantageous to use high-early-strength concrete in the arch ribs. The small additional cost was considered of little account in view of the advantages gained in the earlier completion of the bridges and the elimination of delay.



ARCH-RIB FORMS, SPRUCE RUN BRIDGE
Note cableway for constructing this series of three 150-ft. arches.

The cement used was tested beforehand to insure its meeting the specifications adopted by Allegheny County for high-early-strength portland cement. These specifications agree with those proposed by the American Society for Testing Materials, calling for a tensile strength at one day (when mixed 1 : 3 with Ottawa sand) of 275 lb. and at 3 days, 375 lb.

Temperature changes were frequent and rapid and it was considered advisable to guard against the low temperatures by using a concrete developing from 1,800- to 2,100-lb. compressive strength in 24 hours, thereby reducing the curing period to approximately 30 or 40 hours with its attendant reduction in costs. These compressive strengths were developed, using Ohio River gravel in a 1 : 2 : 4 mix. The advantage of gaining high early strength applies also to the keyways, where it was imperative to develop over 2,000-lb. compressive strength as quickly as possible in the face of fairly rapid temperature changes. Any sudden drop or rise in temperature, causing contraction or expansion in the steel centering, would probably have been disastrous to any concrete in the ribs which had not acquired the strength for which it was designed. This plan proved to be not only workable but successful.

The importance of moving the leased-steel centering from bridge to bridge with as little delay as possible in order to reduce rental charges was also of considerable concern to the contractor. Had the setting advanced more slowly, additional centering would have been required to complete the work within the same time limits. The centering was struck four days after pouring the arch-rib keyways, thereby permitting a saving of 15 to 18 days per arch rib.

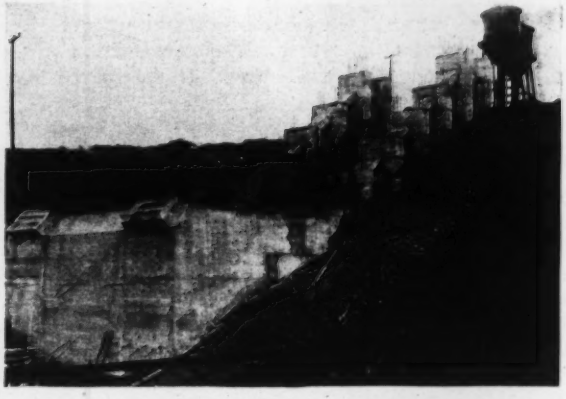
The spandrel column forms were placed the day following the pouring of the ribs. The columns were poured from one to two days after placing the keyways, with the result that the bridge deck forms were assem-

bled and ready to be placed on the supporting columns at the time the steel centering was struck on the fourth day.

The inspector at the batcher plant made frequent tests daily to determine the temperature of the aggregates as they were placed in the trucks. Heat was required at all times regardless of the atmospheric temperature, after winter operations began. The average daily air temperature for the months of December, January and February was 29 deg. and the average temperature of the aggregates leaving the bins was 109 deg. The trucks were covered with tarpaulins to prevent the loss of heat. Warm water was used for mixing and in addition an oil burner was operated in the mixer. The average temperature of the concrete, when it was placed in the forms during the three-months period it was poured, was 71 deg. Metal tubes were inserted at various points in the concrete mass and the temperature of the interior of the concrete was taken at various intervals after placing.

All high-early-strength concrete, which was used in the arch ribs throughout, was closely protected by tarpaulins under which perforated steampipes were placed. The average temperature of this concrete at the end of 24 hours, while being enveloped in steam curing on all sides, was 113 deg. At the end of seven days the average temperature had decreased to 53 deg. Steam curing ceased at the end of 48 hours, after which the concrete was exposed to air temperature averaging 29 deg.

The concrete specimens were stored under curing conditions at approximately 70 deg. and were tested for compressive strength at various ages, such as two, three and seven days. Knowing the interior temperature of the mass and the results of tests obtained at 70-deg. curing, the contractor, after applying an ample safety factor, was in a position to judge accurately the time at which the forms might be removed and the centering withdrawn.



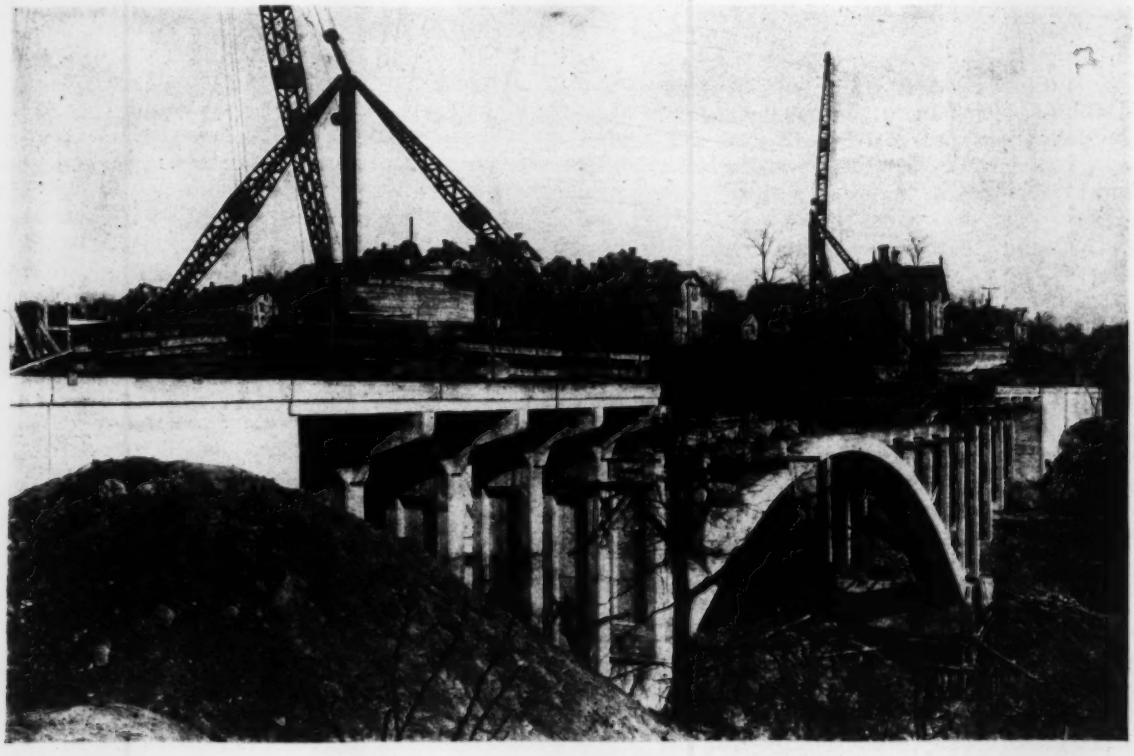
WEST MAIN ABUTMENT STRUCTURE FOR VERNER AVE. BRIDGE

The inspector at the batcher plant made daily determinations of moisture in the sand, and the weight of the batch was adjusted accordingly. The average percentage of moisture content for the three months was 5 per cent, while the maximum was 7 per cent and the minimum 3 per cent.

The concrete materials were mixed for a period of 1½ minutes and delivered to the forms by buckets operated by derrick or by cableway as the case happened to be. Exceptional care was taken in spading the concrete, especially in the arch ribs, where the reinforcing rods were spaced from 6 to 8 in. to and about 4 in. from the intrados surface.

### *Winter Costs and Savings*

The contract involved approximately 100,000 cu.yd. of concrete, 60,000 cu.yd. of which was placed during the winter. It has been demonstrated that winter-bridge



DERRICKS ON APPROACHES, FREMONT ST. ARCH

construction can be done efficiently and economically at seasons when other phases of road construction must be at a standstill. The costs of heating aggregates and curing protection have been made negligible. Winter-concrete hazards have been eliminated. The working schedule has been greatly advanced and costs reduced by the use of high-early-strength cement in the arch ribs. These advantages are outstanding not only because they represent conspicuous avenues of obtaining profits by the contractor, but Allegheny County is also gaining the advantages of the earlier use of the investment, which otherwise would have interest or carrying charges amounting to about $615 per day over a total time saved, conservatively estimated to be about 220 days. It is estimated that 20,000 vehicles will use the boulevard daily when it is thrown open. Bearing in mind the usually accepted figures and basis of estimating the saving in car operation and time loss, this saving to the users of the boulevard demonstrates the tremendous advantage to the public of economic management and the efficient application of modern winter-construction methods.

The cost of carrying the job over the winter, including overhead expenses, has been avoided by following the principles of mass production made possible by taking advantage of time-saving methods at stages of the work where delays and holdups would otherwise occur. This program guarantees the completion of the contract as a whole by November, 1930, while the contract time schedule extends to July, 1931. This is a major factor on this project, which, due to its magnitude, involves a large organization and much equipment, all of which will become available for other work seven months ahead of the contract schedule.

### *Supervision*

This project is being carried on under the direction of the Allegheny County Department of Public Works, with Norman F. Brown director. The contractors are Booth & Flinn, of Pittsburgh, Pa., with George Hockensmith, general superintendent, in complete charge.

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## Foaming and Odor Control in Operation of Flint Sewage-Works

IN THE second year's operation of the sewage-works of Flint, Mich. (see *Engineering News-Record*, Sept. 6, 1928, p. 357), foaming was reduced by circulation, and odor practically eliminated by a special method of chlorination. In the annual report of Harry E. Johnson, chemist in charge, to H. C. McClure, city engineer, appear the following data on these points as well as certain operating figures:

The Imhoff tanks removed 62.5 per cent of suspended solids during the first half of the year and 74.6 during the latter portion, as compared with 55.5 and 74.8 per cent removal for corresponding periods of 1928. The average reduction in organic matter in the sludge due to liquefaction and gasification was 66 per cent, while the reduction in dry solids was 23.4 per cent. The organic content of the raw sludge was 71.1 per cent.

The labor hours per cubic yard of the dry sludge handled averaged 0.57 for the season. A total of 25,725 cu.yd. of wet sludge was drawn, 23,310 cu.yd. to the beds and the remainder to adjacent low ground. The amount of sludge removed from the beds was 8,357 cu.yd., making a reduction of 64 per cent due to shrinkage. The number of bed fillings was 210, the average number per bed during the season being 5.25. The average drying time was 29.5 days per bed.

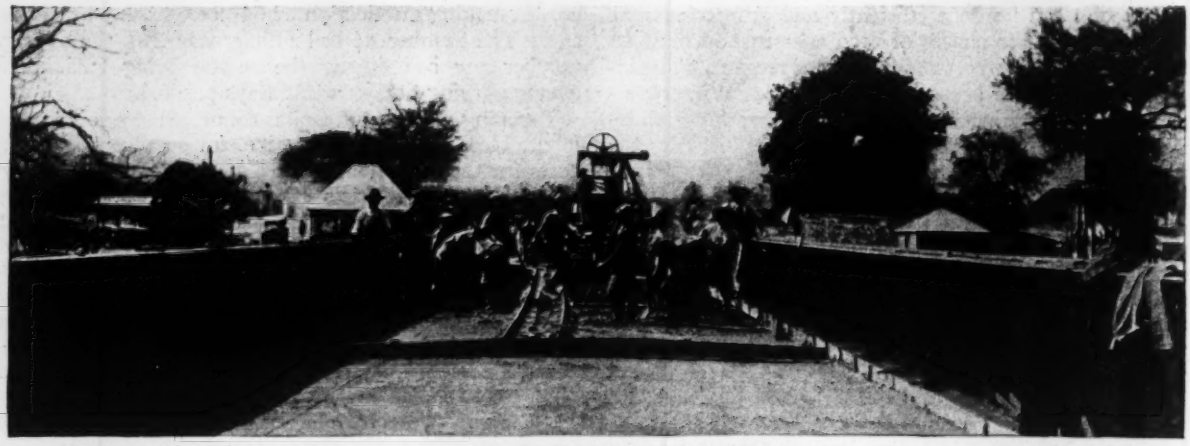
Pumping costs per capita connected were 13c. for labor, 11.8c. for power and 1.2c. for supplies. Treating costs for the same items were 14.3c., 1.8c. and 2.6c. On the million-gallon basis labor cost for pumping was $4.59, power $4.14 and supplies $0.43, while the treatment costs were $5.01, $0.66 and $0.91 respectively for the same items. There was a reduction of $0.72 in pumping costs and an increase of $0.07 per million gallons in the treatment cost over 1928. The unit cost of purchased power was 1.61c. per kilowatt-hour and that of power generated locally 1.21c. Handling dried sludge cost 28.7c. per cubic yard.

*Foaming*—The foaming-control treatment consisted principally of a series of experiments in which the sludge was circulated by means of air lifts. The conclusions to be drawn from the experiments are that a small amount of circulation by air is helpful in promoting balanced digestion, principally by preventing heavy scum formation. Too frequent circulation (with air) produces a bulky sludge, although no other objection has been noted. One or two hours' treatment once a month will keep the scum down and promote uniform digestion without bulking of sludge. Circulation of sludge has been entirely successful in Flint in combating foaming troubles, as it provides a means of keeping the foam under control by mechanical action and at the same time rapidly brings the digestion to a balanced state by making it possible to hold the partly digested sludge until digestion is more complete.

*Odor Control*—As a result of the work done to date the following plan for odor control during the current year has been decided upon: (1) Prechlorination of the raw sewage at the pumping station to retard decomposition in the pressure main and tanks, to destroy odors at the pumping station and tanks and to reduce the chlorine demand at the treatment plant. This treatment is to be intermittent, taking place only during the peak daily flows. (2) Postchlorination of the tank effluent shortly before discharge into the stream. This treatment is to be continuous and complete.

*River Studies*—The immediate oxygen demand causes by far the greatest load on the stream. The amount of oxygen required to satisfy this initial demand may be as high as 500 lb. per hour at times, while the amount available in the stream may drop as low as 40 lb. per hour. It would take an enormous aeration rate to satisfy the initial demand without a depletion of oxygen. It is this rapid using up of oxygen at the start that causes a septic zone in the stream. However, after the initial demand is satisfied the rate of demand drops off to 12 lb. per hour, while the rate of re-aeration in the stream continues at about 25 lb. per hour. At the backwater of the dam the aeration rate drops off to about 8 lb. per hour, but the difference in the rates of supply and demand is not sufficient to cause a depletion of oxygen in the period of time (six hours) required for flowing through this zone.

As chlorination of sewage, to a point where a substantial residual is obtained, completely satisfies the immediate oxygen demand, it follows that this treatment would relieve the immediate load on the stream, and as the rate of absorption is less than the rate of re-aeration, no diminution in the amount of dissolved oxygen in the stream should occur.



CONCRETE BRIDGE FLOOR CONSTRUCTION

# Mexico Builds Highways As the Backbone of National Development

## Republic to the South Looks Upon Its Road Program as an Integral Part of the Building of a Nation Economically and Socially as Well as in the Direction of Complete Communications

By Wallace Thompson
*Editor, Ingenieria Internacional, New York, N. Y.*

Following the Factual Statement of highway development in Mexico which was contributed to *Engineering News-Record* a year ago (Aug. 22, 1929, p. 282) by the Mexican engineer Vincente Saucedo, this appraisal by a trained editorial observer of the work and of the development policies which are behind it is of particular interest. It was no purpose of Mr. Thompson in this article to discuss the technicalities of Mexican road-building practices; he has undertaken rather to indicate the spirit which is inspiring and advancing the movement in our neighboring republic for a great national public roads system. The result is an interpretative article of high excellence. —Editor.

MEXICO is deliberately building a national highway system as the backbone of the new nation which the Mexican leaders consider that they have been creating since the end, five years ago, of the pains and discomforts of the revolutionary period. To this end the government has spent $21,000,000 since 1925; is spending $5,850,000 this year, and has a program laid out for an expenditure of $33,150,000 from 1931 to 1934. Every cent of this expenditure is out of income. The great hope of the present government, however, is that in the course of the present negotiations with the International Bankers Committee over the Mexican debt, or in a later similar conference, it may be possible to arrange for Mexico to issue road bonds that will allow her to put $60,000,000 to $100,000,000 into highways at one shot, to bring the whole road program a generation nearer to realization.

At the present time Mexico has about 2,500 km. of modern highway, and 99,419 km. of "roads." Her automobile registration works out to 0.77 automobile per kilometer of the latter figure. But the actual mileage of improved roads is in many ways the least significant of the items to be considered in judging the situation. Far more important are the broad general plans of the Mexican highway engineers, and the actual steps which have been taken toward the realization of those plans.

### *Non-Competitive Low-Cost Roads*

Most of the countries where good highways are new have taken the false step of building all their first modern highways along well-established routes, competing with railways, as a rule, and thus adding almost nothing to the total of the country's communication facilities. Mexico has carefully avoided this pitfall, and the national plan for highway development is based on the ideal of developing the country, rather than merely making pleasant and convenient driving places for pleasure cars.

Another most important phase of the Mexican highway development is the extent to which the Mexican engineers have worked out an efficient low-cost highway system of good surfaced roads, capable of bearing up under rains and traffic, and using the Mexican resources, of road metal and surfacing oil, which are available. The distinctively Mexican road metal of *tepetate,* a disintegrated stone which is easily cut and crushed but hardens on exposure to the air, is used where it is available. As a general type of surface on the main trunk highways the heavy asphalt-base Mexican petroleum is used to make an asphaltic macadam which, while it has its limitations and definite life, gives a fine and fairly dustproof highway at low cost which is becoming increasingly characteristic of the Mexican national highway system. Modern machinery is extensively used, although low wages for common labor make the old

pick and shovel still standard in some isolated sections. On the whole, however, Mexico is distinctly one of the newer countries where earth-moving and grading machinery is widely used and handled with much skill by the Mexican workmen.

### *Education Through National Road Show*

As stated above, Mexico is looking upon its highway development as an integral part of the building of the nation, economically and socially as well as in the direction of complete communications. The Third National Highway Congress, held in the city of Mexico recently, drew the attention not merely of the government and the engineers but of the public and of the important section of Mexican life which looks to the expansion of Mexican prestige and interest beyond the national borders. Some 300 state and municipal delegates to the highway congress and to the touring congress met in the capital, discussed highway developments and plans for

GRADING WITH MOTOR TRUCKS LOADED BY HAND

encouraging tourist travel both from within and from without, and viewed the exhibit of machinery which was set up in the semicircular halls beneath the concrete National Stadium in the outskirts of the city.

The papers presented at the congress reflected a catholicity of interest, but also showed the practical direction in which the study of the Mexican engineers and officials is turning. The discussion of the relation of highways to population, to forestry and to agriculture, the relations of highways to railways and the importance of making them co-operative instead of competitive—topics such as these marked the sessions. The attendance at the machinery show was but a part of the congress, and indeed the sessions of the congress being held in the center of the city, in the National Theater, made the presence of the delegates at the machinery exhibit largely dependent on the interest of the delegates in that phase of the road problem. The attendance at the show was large, however, and the government brought busloads of school children to see the exhibits, during off hours, as a part of their educational development. The machinery exhibit had been officially opened by the president of the republic, Pascual Ortiz Rubio, and the ministers of finance and of communications presided at the opening session of the congress, at which delegates from the United States, and the minister of Peru, on the part of the other countries in the Pan American Union, spoke.

The National Highway Commission and the U. S. Bureau of Public Roads had technical exhibits located in the National Theater, and these were studied by the delegates with much interest. The elaborate technical presentation of soil analysis and road-building methods from the U. S. Bureau of Public Roads was in charge of E. W. James, chief of the division of traffic of the

OILING THE MEXICO-ACAPULCO HIGHWAY

bureau, who is widely known and highly regarded throughout all the American countries.

### *Nature and Progress of Program*

Mexico's road program, as was evident to the visitor and to the delegates from the states and municipalities at the congress, is a studied and complete whole. Few countries in the world have planned their highway development more completely, set down its stages of unfoldment so carefully and faced so wide a range of considerations in their plans. The future highway system of the country is carefully laid out, although only about $5,000,000 annually is now being spent upon it, and for the next vital period of highway development this definite plan will be carried out. This will be followed, whether the work is done on the annual appropriation or whether, as is hoped, a financing of a vast national highway development can be worked out and the construction pushed ahead by decades.

The highway system as planned includes a carefully determined list of necessary roads, those of first importance, and thereafter less important and feeder roads, to be constructed by the states, the municipalities or, if necessary ultimately, by the government. The surface treatment accorded the various roads is scaled strictly to the traffic, actual and immediately prospective, and while at present the best type of main highway in Mexico is the native bituminous macadam, roads of concrete and asphalt will be laid when traffic justifies them. It is worthy of mention here, however, that the asphaltic macadam developed by the Mexican engineers in the national highway system is a model of low-cost surfacing

GRADING WITH POWER SHOVEL AND TRUCKS, MEXICO-LAREDO HIGHWAY

PAPAGAYO BRIDGE ON THE MEXICO-ACAPULCO HIGHWAY

and one in which the heavy asphalt-base Mexican petroleum is an important factor.

The Mexican highway system, as laid out, is designed with two ends in view. First is the opening of the untapped agricultural and mining regions of the interior, which for centuries have been almost isolated by lack of good communications, and the second is the opening of trunk highways to the United States border and roads to historic centers with the purpose of facilitating and inviting an increasing automobile tourist traffic. In the plan of development there is a paralleling of the railway line to Laredo, as this is the only feasible route (except that to El Paso, to be developed later) for the entry of automobile tourists. The highway, however, lies in the hills far to the west of the railway line, in a rich agricultural and forested section, coming down to the cities but endeavoring as far as possible to open new fields and not compete directly with the railways. With the exception of this and similar routes, like those to Cuernavaca and the road, now building, to Guadalajara, connecting important cities or tourist centers, the Mexican highway system is being laid out with the view to opening, first of all, new territory, untouched by the railways.

This is an extremely important phase of the plan, not only because the highways should not be made to compete with the railways but because Mexico is particularly in need of developments that reach beyond the territory now open through the existing railways. Until the present system of highways was begun the chief cities of Mexico were almost exclusively dependent for food on the regions directly adjacent, for the chief railways went to mining camps and to the border and the coast, and when crops failed, food had to be imported by rail from the United States or by sea from other countries. The present highway plan will open up rich agricultural regions to the capital and other centers of population, enabling the country to feed itself at all times and for prosperity to spread broadly into the countryside.

The plans for inducing tourist traffic to come to Mexico by the new highways to the border are far-sighted, and include such acute analyses of the situation as the fact that Mexico offers a winter as well as a summer touring ground, to which the farmers of the United States, as well as others, can travel in ease and comfort in their own automobiles at periods when the farmer, at any rate, can travel, as he cannot do in summer when his crops are ripening. The immense sums spent by tourists from the United States in their summer excursions to Canada are taken as a justified indication of what may be hoped and looked for when the golden stream can be turned toward Mexico.

The highway development is going forward on the road from Mexico City to Laredo (total length, 1,242 km.), only a short section, although in heavy construction, remaining to be opened. Improvement of the surface is going ahead steadily, the asphalt surface being finished from Laredo to Monterey. The highway to the

FLATTENING OUT A CURVE WITH MOTOR TRUCKS AND PORTABLE LOADERS

Pacific port of Acapulco from Mexico City (total length, 440 km.) is open and is being used extensively. The road to Puebla (135 km.) is in fine condition, and is to be built on to Vera Cruz. The highway is in excellent condition from Mexico City to Toluca, whence the work through Morelia to Guadalajara is progressing, although still in the early construction stage. The road is open to Oaxaca, although the going is not easy; this, with the Laredo-Mexico City road, is part of the Pan American highway system. When extended to Guatemala, the Oaxaca road will be 1,435 km. During the sessions of the congress a party of tourists from the Automobile Club of Los Angeles came through by automobile to the city of Mexico via the west coast and Guadalajara and took their way out again through Laredo.

# Derivation of Theories Underlying Mechanical Methods of Stress Analysis

By C. B. McCullough
*Bridge Engineer, State Highway Department, Salem, Ore.*

The Increasing Use of mechanical methods of stress analysis and the natural tendency for the work to become more mechanical and less analytical make it worth while to emphasize the theory upon which all of the types of analysis equipment are based. Mr. McCullough's discussion of Maxwell's theorem and its application to mechanical stress analysis is a most thorough and at the same time clear and concise one. Accordingly, it is published here with no apology for the fact that he presented it some time ago at the last meeting of the American Association of State Highway Officials.

—Editor.

IN THE simple beam span (Fig. 1*a*), if a unit vertical load be applied at any point *a*, producing moments $M_a$ throughout the length of the beam, the vertical displacement of any other point *b* is given by the expression

$$\delta_{ab} = \Sigma M_a M_b \frac{ds}{EI} \qquad (1)$$

where $\delta$ represents the displacement under discussion; $M_a$ = the moment at any section of the beam due solely to the unit load at point *a*; $M_b$ = the corresponding moment due solely to a unit auxiliary load applied at a point *b*.

In the subscript notation used above for the term $\delta$ and also hereafter throughout the discussion, the first subscript defines the position of the load and the second subscript the point at which the deflection is to be measured. For example, if the above load be removed and the beam reloaded with a unit vertical load at point *b* (Fig. 1*b*), the vertical displacement at point *a* is found from the expression

$$\delta_{ba} = \Sigma M_a M_b \frac{ds}{EI} \qquad (2)$$

The second term of this expression is identical with the second term of equation 1, whence

$$\delta_{ab} = \delta_{ba} \qquad (3)$$

Equation 3 expresses (for vertical loads) the law of reciprocal displacements, first stated by Maxwell in 1864 and commonly known as Maxwell's theorem. Expressed in words: "The vertical displacement of any point *a* in a beam or frame, due to a unit vertical load at any other point *b*, is equal to the corresponding vertical displacement of the second point *b* for a unit vertical load applied at the first point *a*."

This principle may be extended to include angular as well as linear displacements, as indicated in Figs. 1*c* and 1*d*, and to inclined as well as vertical or angular loads or distortions. This is indicated in Fig. 2, provided that in each case the distortion at each point is measured in the same direction as the load applied at that point.

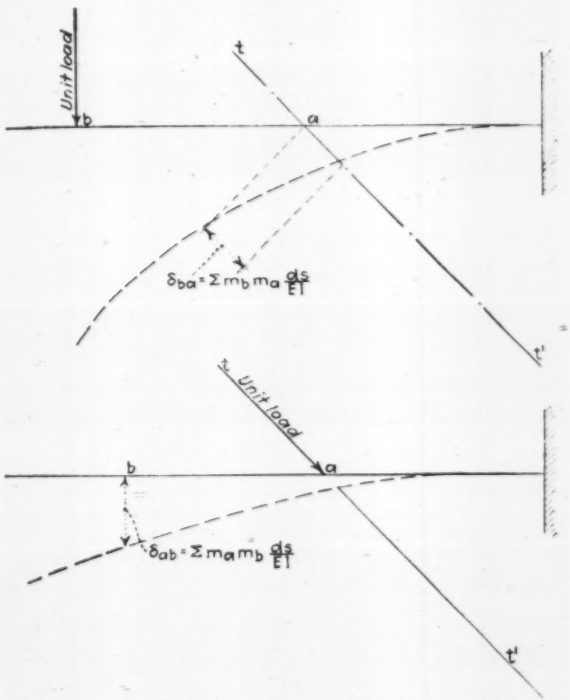



FIG. 2—GRAPHIC EXPLANATION OF MAXWELL'S THEOREM AS APPLIED TO INCLINED LOADS

The general law which applies to any two unit loads such as (*a*) two unit vertical loads, (*b*) two unit oblique or inclined loads, (*c*) a unit load in any direction and a unit moment-couple, (*d*) two unit moment-couples, may be stated as follows: "The distortion (either angular or linear and measured in any given direction) of any point *a* in a beam or frame due to a unit load (either angular or linear and in any direction) at any other point *b* is equal to the distortion at the second point *b* due to a unit load at the first point *a*, provided that at each point the loads and distortions are always measured in the same direction."

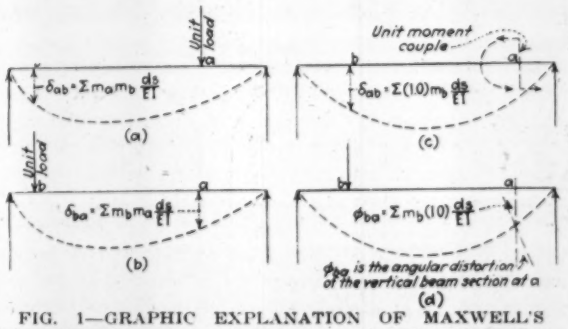



FIG. 1—GRAPHIC EXPLANATION OF MAXWELL'S THEOREM OF RECIPROCAL DISPLACEMENTS, EITHER VERTICAL OR ANGULAR DISPLACEMENTS

The displacement at any point is given only in the direction that the load at that point has previously been assumed to act. In other words, if the load at *b* is a moment couple, the only deflection obtainable through this relationship is the angular distortion.

The principle commonly known as Maxwell's theorem furnishes a basis for the various mechanical methods of structural analysis, some of which will be described.

In a fixed arch, for example, if the left support be removed, as in Fig. 3*a*, the structure becomes a cantilever under the action of the applied loads and three unknown reaction components, an axial thrust $T$, a shear $J$ and a bending moment $M$. Considering each of these reaction components in turn, first apply to the residual cantilever a certain definite displacement $K$ (Fig. 3*b*), measured along the line of action of the unknown axial thrust $T$. This definite axial displacement $K$ may be considered as the axial distortion resulting from some

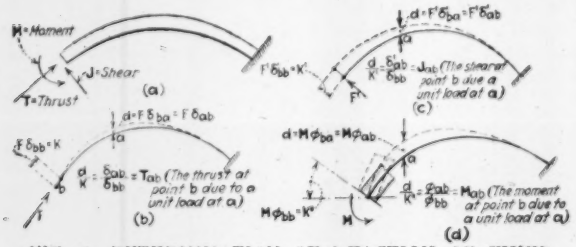

M=Moment
J=Shear
T=Thrust
(a)
(b)
(c)
(d)
(The shear at point b due to a unit load at a)
(The thrust at point b due to a unit load at a)
(The moment at point b due to a unit load at a)

FIG. 3—DETERMINATION OF REACTION OF FIXED ARCH ABUTMENTS BY SUBJECTING ONE SUPPORT TO KNOWN DISPLACEMENTS

definite but unknown axial force $F$. That is to say, $K = F\delta_{bb}$.

The application of this artificial and arbitrary axial distortion $K$ causes the cantilever to distort or deflect as indicated at Fig. 3*b*. The vertical displacement $d$ at any point $a$ represents the term $F\delta_{ab}$. In other words, $d$ represents (to the same scale as $K$) the vertical displacement at $a$ caused by a unit load applied axially at point $b$, multiplied by the value $F$, representing the unknown axial load, causing the arbitrary axial displacement $K$.

Since from Maxwell's theorem, $\delta_{ba} = \delta_{ab}$

$$d = F\delta_{ab} \quad \text{and} \quad \frac{d}{K} = \frac{\delta_{ab}}{\delta_{bb}}$$

Also since $\delta_{ab}$ is the displacement at point $b$ caused by a unit vertical load at point $a$ applied to the residual cantilever, it is apparent that the value of the true axial thrust $T$ on the arch must be such as to counteract this displacement and sustain the arch in a fixed position. Since a unit thrust will cause the axial distortion $\delta_{bb}$ at point $b$, the value of the true thrust at $b$ for a unit load at point $a$ must be

$$T_{ab} = \frac{\delta_{ab}}{\delta_{bb}} \quad \text{or} \quad \frac{d}{K}$$

It is thus apparent that the ordinates intercepted between the original and the deflected position of the rib, when divided by the constant $K$, represent the influence ordinates for the axial thrust $T$ at point $b$.

Proceeding in exactly the same manner, but giving point $b$ an arbitrary lateral (or shearing) distortion $K'$ rather than an axial displacement, the influence line for the shear $J$ at point $b$ is readily developed (Fig. 3*c*). Also if the arbitrary displacement at point $b$ be made an angular rotation $K''$ (Fig. 3*d*), the influence line for the moment $M$ at point $b$ can be readily developed.

These methods of mechanical analysis are not necessarily limited to single-span structures, but may be extended to include span arrangements of the most complex type. In fact, the peculiar adaptability of this method of attack to multi-span elastic structures furnishes its greatest point of superiority. For example, in Fig. 4*a* the method obviously furnishes a basis for the complete determination of the three unknown reaction components at the left support. Furthermore, if the rib were to be split for a certain distance, extending from the right support, as shown at Fig. 4*b*, the underlying theory would in no way be affected and the method would still apply. If these arms were to be extended laterally to form a pier and second arch rib (Fig. 4*c*) the theory would still apply, and again if the second arch rib were divided and developed into a third span (Figs. 4*d* and 4*e*) the method of attack would in nowise be affected.

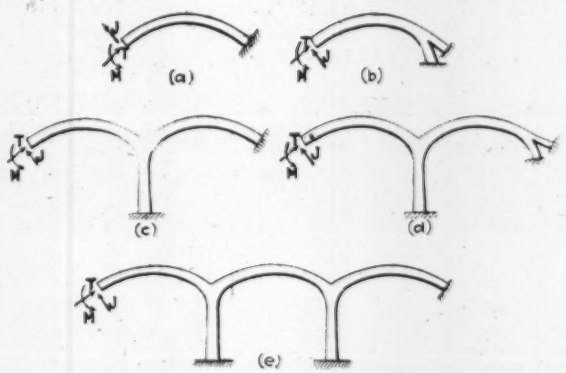



FIG. 4—EXTENSION OF METHOD OF FIG. 3 TO MULTI-SPAN LAYOUTS

As a second illustration, Fig. 5 indicates the development of a simple vertical cantilever into a three-span arch and indicates that the method may be used to obtain the reaction component influence lines for the reactions at each pier, as well as for the end supports.

The use of Maxwell's theorem as explained above may be utilized for determining the reactions at any support (and as a matter of fact for determining the stresses at any interior cross-section as well) for any type of elastic structure, regardless of its shape or support arrangement.

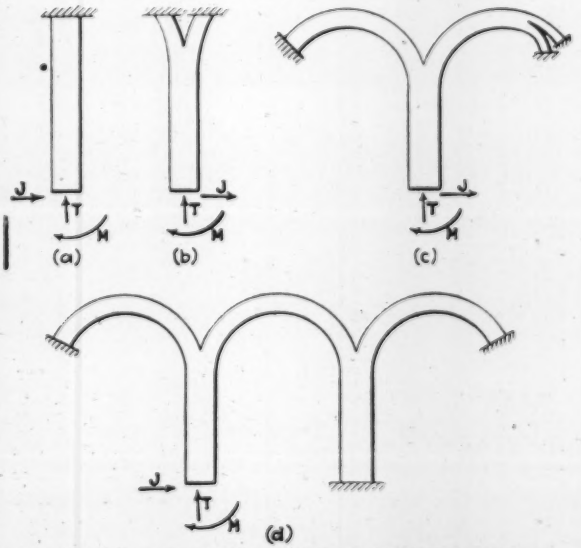



FIG. 5—EXTENSION OF METHOD OF FIG. 3 TO DETERMINATION OF PIER REACTIONS

# Concrete Road-Building Methods for Street Paving

## Use of 27-Ft. Finishing Machine, Mixer-Hauled Subgrade Templet, Bulk Cement and Central Batching Gives Lower Costs and Smoother Pavement at Pekin, Ill.

By William E. Barker
*Portland Cement Association, Chicago, Ill.*

FINISHING machines and mixer-hauled subgrade templets were recently employed with reduced cost and increased perfection of the work on wide street paving at Pekin, Ill. The pavement measures 31 ft. from back to back of curb. The over-all width of each combined curb and gutter is 2 ft., making the pavement slab 27 ft. wide. The finishing machine was originally the standard 18-ft. width used on Illinois state highways. The extension parts needed to make it 27 ft. wide cost $1,100. Altogether 120,000 sq.yd. of pavement was constructed.

### *General Paving Procedure*

The curb and gutter units were built last, after the pavement had been opened to traffic, so the finisher was supported on regular steel side forms. Although the slab

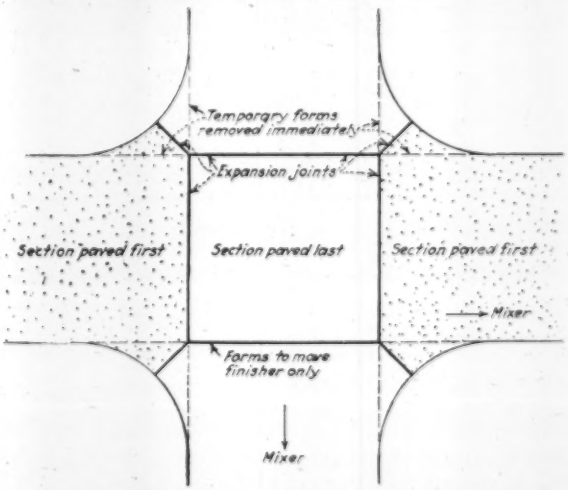



FIG. 1—METHOD OF FINISHING INTERSECTION BY MACHINE
On the street paved first, paving was continued to the expansion joints in the intersection. Forms were set through the intersection to carry the finisher across the intersection. The middle portion was omitted, and paved when the second street was paved, so that the mixer would not have to ride over the concrete.

is only 7 in. thick, 9-in. forms were used, the extra form depth assuring the strength required to support the finishing machine without deflection. Holes were burned through the forms so that the ½-in. dowel rods used to tie gutter and slab together could project through them; these rods were 3 ft. long, spaced 5 ft. apart.

At an intersection of two streets, both of which were being paved, the forms were continued through the intersection on the street paved first. Expansion joints in the intersection were placed as indicated by Fig. 1 and concreting was stopped at the joints. When the cross street was paved the wheels of subgrade templet and finisher rode on the edge of the hardened slab. That part of the intersection too wide to be reached by the finisher was struck off and finished by hand. The forms were removed

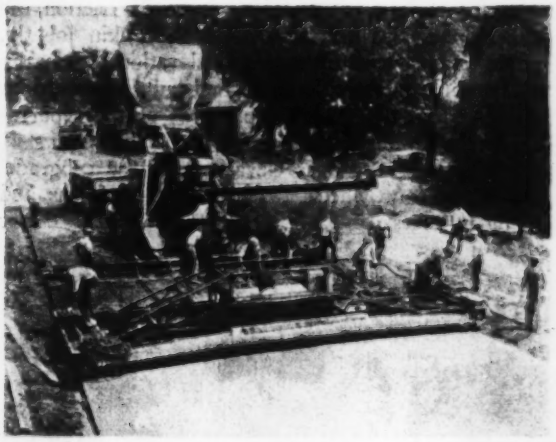


FIG. 2—THE 27-FT. STREET SLAB WAS FINISHED BY MACHINE
Curb and gutter were built after the pavement hardened.

as soon as the finisher had passed, and the concrete on either side of the cavity thus left was broken down to prevent formation of a plane of weakness and subsequent cracking.

The only other finishing tools required were a belt, which was used to give the surface its gritty texture, after some evaporation had occurred; a split float, used to smooth the concrete at joints, and two long-handled floats with which any uneven or disturbed places were further finished. The pavement was cured with wet burlap and later with a surface application of calcium chloride.

The chief advantages of mechanical finishing were the reduction in labor cost, the use of drier concrete and freedom from inequalities in the finished surface. The labor cost was reduced because the machine replaced three of the men who ordinarily strike off and puddle the concrete. In addition, a greater yardage was placed per day than with the usual hand-finishing gang. The pavement was straight-edged before it was finally finished and any inequalities were removed. The cost of this operation was also reduced by the finishing machine, as few surface corrections were required.

A reduction in annoyance was perhaps of even greater importance. Few things about a hand-finished paving job are causes for more bickering between engineers and contractors than evenness of surface. This annoyance was completely eliminated by the finisher.

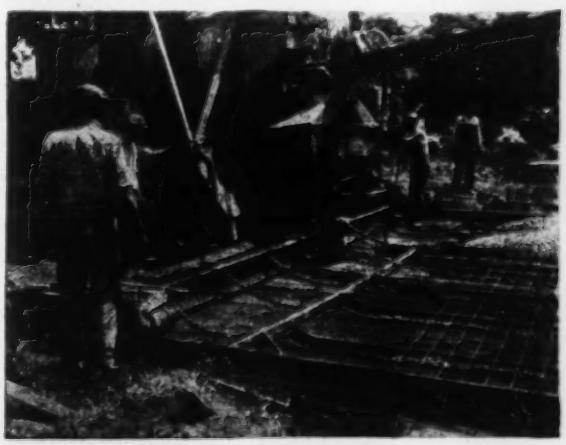


FIG. 3—SUBGRADE PLANER PULLED FORWARD BY MIXER

Subgrade elevation is another source of friction between engineer and contractor. On the Pekin job the subgrade was brought to the proper elevation by a heavy templet resting on the side forms and pulled forward by the mixer (Fig. 3). This templet was of the type required by the Illinois division of highways, having a steel cutting edge at the proper elevation for the subgrade, supported on four wheels that run on the forms and weighing in excess of 35 lb. per foot of length. Every

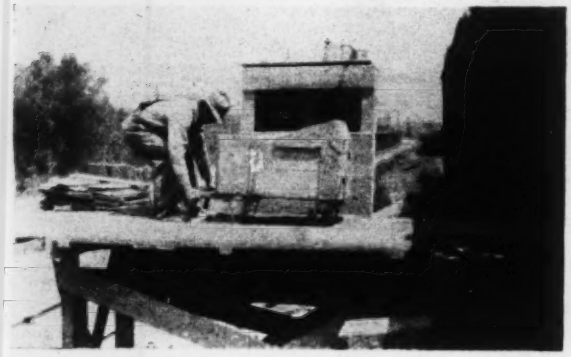


FIG. 4—BULK CEMENT LOADED INTO BOXES ON HAND TRUCKS

few days the inspector checked both subgrade templet and finishing machine screed, and made any necessary adjustments, so there could be no error in the thickness of the concrete.

### *Central Batching and Hauling*

Materials were hauled to the 27-E mixer in six-sack batches proportioned at a central plant 2 miles from the city. This location was selected because at that point

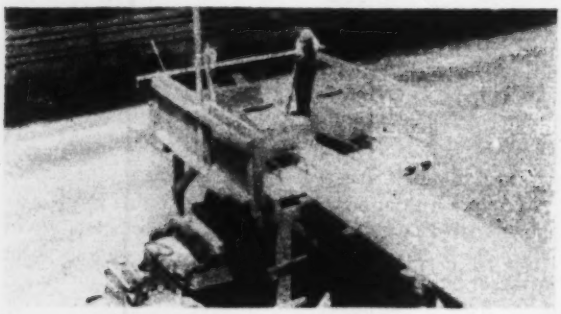


FIG. 5—CEMENT DUMPED INTO HOPPERS OVER TRUCKS

there are adequate railway facilities and a commercial plant producing sand and gravel, and a concrete highway leading directly to the portion of the city where most of the work was being done. About fourteen trucks, each carrying two batches, were required. An average of two carloads of bulk cement was used daily. It was received in box cars and three workmen shoveled it into boxes set on hand trucks (Fig. 4) like those commonly used in moving heavy packages. The front end of the box was a gate that opened when the cement was dumped. The arrangement made dumping much easier than when cement is carried in concrete buggies.

Each batch of cement was weighed on a platform scale set in the runway between car and dumping hoppers. There were two dumping hoppers (Fig. 5), set so that cement could be dropped into both compartments of the truck at once. Two men weighed and wheeled the cement and tripped the cement hoppers, making a total of five men handling the cement. That is the number required to handle sacked cement, so the contractor saved the cost of lost sacks and of baling; handling and shipping sacks as well as about 10c. a barrel on the cost of cement.

A gang of approximately 40 men built the curb and gutter. Concrete for the curb was mixed at a central plant, located near the central proportioning plant, and hauled in light trucks to its location on the street. Two men at this mixing plant were able to supply all the concrete needed for curb and gutter. As the pavement was already completed and opened to traffic, the concrete was dumped along the edge of the slab at measured intervals and shoveled from those piles into the forms.

Curb and gutter forms were of steel, the back form in two channel sections and the face form of metal plate bent to the proper shape. Clamps were permanently fastened to the face forms. No gutter form was needed, as the concrete was placed against the edge of the slab.

FIG. 6—CURB AND GUTTER WAS BUILT AFTER THE PAVEMENT HARDENED
Surfacing coat was put on with a mule resting on the back form and pavement edge.

Division plates were spaced at 10-ft. intervals, cutting the curb and gutter into 10-ft. blocks. Expansion joints in curb and gutter were placed exactly in line with those in the pavement—a very necessary arrangement when gutter and slab are tied together.

The base course for the curb was proportioned 1 : 6, using a graded mixture of sand and pebbles. This concrete was tamped into place and properly spaded, then a 1 : 2 mortar topping was distributed over it with shovels and floated into place with a mule (Fig. 6) that rested on back form and slab. The top course was mixed by hand, in mortar boxes, and transported in wheelbarrows.

During one nine-hour day 1,885 ft. of curb and gutter was laid. The average for the whole job was more than 1,000 ft. per calendar day, including rainy days and Sundays. Jansen & Schaffer were the contractors and the work was done under the direction of the city engineer, Edwin Fitzgerald.

## Car Dumper Sets Performance Record

What is believed to be a record for unloading railway cars into a ship was recently established at the Toledo, Ohio, dock of the New York Central Railroad (Ohio Central Lines) when an electric car dumper unloaded a total of 243 cars containing 12,763 tons of material in four hours, 12½ minutes, averaging 57¾ cars per hour. Time taken for shifting the boat is included.

# Highway Relocation

## *Some Principles and an Example*

### Economic Objectives—Improvement of Alignment—Comparing Alternative Locations—Classification of Roads—Description of a Specific Example

By W. A. Van Duzer

*Assistant Chief Engineer, State Department of Highways, Harrisburg, Pa.*

PREVIOUS to the advent of the automobile there was little agitation for the reduction of grades or elimination of curvature in highways. Pennsylvania is not unlike other states having rough topography. The roads were developed from old original Indian trails and were made to accommodate successive stages of traffic such as pack horses and horse-drawn vehicles, the improvements following the line of least resistance. The resulting alignment was, therefore, more or less circuitous, and in order to accommodate the advancement in modes of transportation relocations became a necessity.

The majority of the states, after the establishment of state highway departments, studied the systems that had been turned over to the states for construction and maintenance and formulated legislation permitting these relocations. The legislature of Pennsylvania, in laying out the state highway system, designated certain control points such as villages, towns, boroughs and cities, leaving to the discretion of the department engineers the location of the roads between these points.

*General Considerations*—The first opposition was voiced by the residents along the road when attempts were made to relocate, due to their investment in developments along the highway. However, in planning state highway improvements, the department, in the majority of cases, is dealing with the main highways of the state, and therefore must take a statewide viewpoint as to traffic requirements as well as the needs of the immediate locality.

Another factor that the department must consider in relocating state highways is the future importance of the highway. Will the highway ultimately develop into an important through route highway, or remain as a local service road? A correct forecast on this point is important and requires a thorough study of all the factors which may affect future traffic, such as probable agricultural, industrial or mining developments, increase in population and other social and economic possibilities. The decision on this point determines the standards of design as to alignment, grade, width, type and thickness of pavements, and co-ordinates construction expenditures with traffic capacity and use.

*Alignment of First Importance*—The design of highway improvements must incorporate the safety features demanded by present high-speed motor vehicle traffic. The alignment is of paramount importance, and every effort should be made to keep the curvature down to the absolute minimum. Provision should also be made to obtain sufficient sight distance on horizontal curves and at the summit of grades, and the curves should be banked. The grade of the highway should follow, in general, the surface of the ground without becoming choppy. This, of course, is not always possible where the maximum grade permitted by the standards of the department would be exceeded.

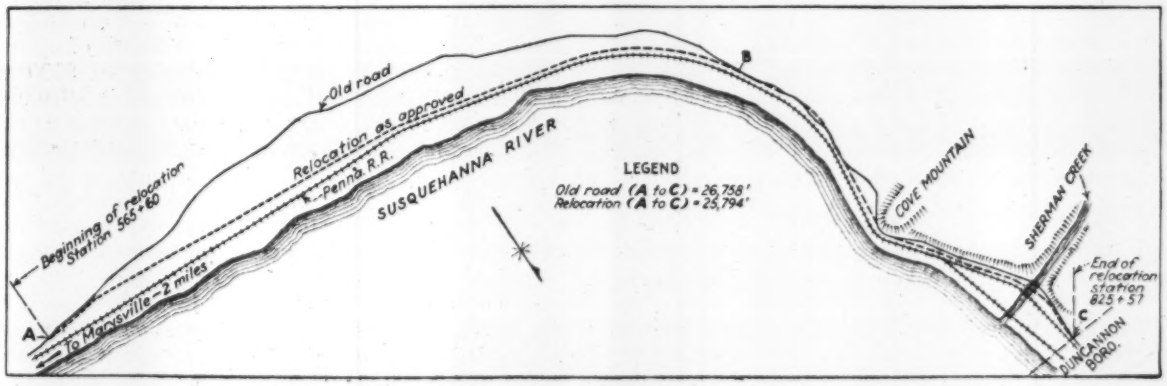



FIG. 1—RELOCATION REDUCED CURVATURE AND GAVE SHORTER LINE

*Comparing Alternative Locations*—Economic comparisons of one or more lines are necessary due to the high cost of construction and operating costs of continually increasing traffic. The elements entering into the economic considerations are length, alignment, grades, construction costs and operating costs, which are based on future traffic. Consideration has to be given also to probable operating losses due to obstructions to the free flow of traffic. Other factors to be considered are effects on maintenance, geological formations and likelihood of snowdrifts. All of these are pertinent to studies of highway location.

*Classes of Highways*—To co-ordinate construction standards with the importance of the highway, the department has divided the highways into three classes, based on future average daily traffic, as follows: class I, 3,000 or more vehicles; class II, 1,000 to 3,000 vehicles (500 vehicles per day minimum on primary routes); class III, less than 1,000 vehicles (less than 500 vehicles per day on primary routes). The standards of construc-

FIG. 2—VIEW FROM *A* LOOKING WEST, SHOWING OLD AND NEW LOCATIONS

tion prescribed for these three classes of highways are as shown in the accompanying tabulation.

*Example of Highway Relocation*—Fig. 1 is a sketch of a typical highway relocation made by this department. The alignment of the old road was not satisfactory; it was somewhat indirect and contained many objectionable curves.

Three possibilities of bettering the old conditions were: (1) following the old road with minor line revision to better the alignment; (2) relocating by paralleling the railroad tracks as shown by the dashed line in Fig. 1; (3) a combination of 1 and 2, by following scheme 1 between points *A* and *B*, and scheme 2 between points *B* and *C*.

Field surveys were made and a relocation report submitted comparing the various economic factors on each of the locations. The old route location, while offering the cheapest estimated construction costs and the least amount of damages involved for immediate construction, was considered undesirable from the economic standpoints of annual operation costs and ultimate damages. Also, it was much more indirect than any of the alternate relocations and was objectionable on account of alignment and grades, particularly the former. The old location was not feasible for construction without numerous minor line revisions, and even if they were made the dangerous features in alignment around the nose of Cove Mountain would not be eliminated.

The annual operating cost was predicated on 3,000 automobiles and 200 trucks. The cost of operation of the average passenger vehicle is assumed to be $0.0957 per mile, and $0.3456 per mile for the average truck. The truck-mile cost is variable.

The relocation as shown by the dashed line in Fig. 1 was approved for construction in preference to the old location, for: (1) a saving of 965 ft. of distance; (2) an estimated saving of approximately $28,000 of annual operation costs; (3) an estimated saving of $100,000 in ultimate damages; (4) an improvement in alignment and a resulting improvement in safety conditions; and (5) a more favorable site from an ultimate right-of-way standpoint.

The above-named five points are the determining factors on our highway locations. That is, the saving of distance, the annual operating costs, the land damages, improvement in alignment and safety conditions, the ultimate right-of-way standpoint, and (a sixth may be added) the estimated construction costs on the different line suggested. It can be readily seen that if there is a saving of $28,000 in annual operating costs construction costs could be justified.

The Pennsylvania department of highways recognizes that the people eventually pay for the improvement, either directly or indirectly. If by additional construction expenditure per mile, a sufficient saving can be made in the annual operating costs to the users of the highway, there is ample justification from an economic standpoint for the increased construction costs.

PENNSYLVANIA DEPARTMENT OF HIGHWAYS STANDARDS FOR CLASS I, II AND III ROADS

| | | Class I | Class II | Class III |
|---|---|---|---|---|
| Traffic | | Over 3,000 vehicles per day | 1,000 to 3,000 vehicles per day. 500 vehicles per day minimum on primary routes | Less than 500 vehicles per day on primary routes. Less than 1,000 vehicles per day on other roads |
| Width | Shoulders | 10 ft. | 8 or 10 ft. | 5 to 8 ft. |
| | Paving—No curb | 30 to 40 ft.—3 or 4 10-ft. lanes with doweled longitudinal joints | 18 or 20 ft.—2 9- or 10-ft. lanes with doweled longitudinal joints | 18 ft.—2 9-ft. lanes with doweled longitudinal joints |
| | Curb | 46-ft. minimum—3 10-ft. lanes, 2 8-ft. parking lanes | 34 or 36 ft.—2 9- or 10-ft. lanes 2 8-ft. parking lanes | |
| | Bridges | 40 to 50 ft. wide | 40 ft. wide | 30 ft. wide |
| Grades | Maximum per cent | 7 | 7—No explanation required for 8 | 8 |
| | Maximum per cent on grade crossing eliminations | 5 | 2,000 ft. maximum length for 8 | 2,000 ft. maximum length for 8 |
| Alignment | Maximum degree | 4—Explanation required for curves over 4 deg. | 5 | 6 |
| | Maximum degree and minimum clearance on grade-crossing eliminations | 6—14-ft. minimum clearance on undergrade. 22-ft. minimum clearance on overhead | 4—Explanation required for curves over 4 deg.<br>6—14-ft. minimum clearance on undergrade. 22-ft. minimum clearance on overhead | 6—Explanation required for curves over 6 deg.<br>8—14-ft. minimum clearance on undergrade. 22-ft. minimum clearance on overhead |
| Sight distance | Minimum horizontal and vertical | 400 ft.—500 ft. if possible. | 400 ft.—500 ft. if possible. | 300 ft.—500 ft. if possible. |
| Depth | | 10x8x10 in. or equivalent | 9x7x9 in. | 9x7x9 in.<br>8x6x8 in. on very light traffic |

General: Avoid sharp curves at ends of long tangents and at bottoms and tops of steep grades. Minimum tangent between reverse curves is 150 ft. Compound curves are not satisfactory if there is any appreciable difference in radii. Avoid broken-back curves. Avoid more than one break in grade in long open horizontal curves. Avoid beginning a horizontal curve at or immediately beyond a summit.

# Federal Engineering Reorganization

By Kendall K. Hoyt
*Washington Office, Engineering News-Record*

REBUILDING of the Interior Department, resulting to some degree in a reorganization of government engineering functions, has been given new impetus, according to recent press comment. Although limited action to this end in the near future is not improbable, the suggestion that the department is working itself out of a job is far from true. Acting Secretary John H. Edwards has been quoted as saying, what he later denied, that the Public Park Service is the only rapidly growing bureau in the system. If this were so, some hope might be held out that the Department of Public Works plan might be revived to build the Interior Department up to working strength. However, development seems more likely along the lines which are being worked out by President Hoover's public lands policy committee.

It is true that the Interior Department has been losing ground because of the transfer to other departments of the Patent Office, the Bureau of Mines and recently the Bureau of Pensions. Although this last transfer took with it two-thirds of the Interior appropriations for 1931, the loss is not vital, since the funds were simply held by the Bureau of Pensions for disbursement. A sum of $105,000,000 still remains to be distributed among a system of bureaus whose termination or even reduction is not a matter of imminent concern, although some internal shifts may be found desirable.

Of these the Park, Indian and Reclamation services are largest. The Park Service is growing both in territory and scope. The Indian Bureau still is a large and far-flung institution whose work cannot end in a day or a decade, though an effort is being made to bring the Indians who are federal wards to the point where they can assume full citizenship. Reclamation work has developed most of the choice sites remaining on public land, and other desirable areas have gone into private hands. After that, there is a large revolving fund to administer. The President has indicated that the fund may be used to finance co-operative projects on private or state land on a sound repayment plan through power and water sales.

None of the other Interior agencies totals as much as $3,000,000 per year of direct federal appropriation, not counting co-operative money from federal and state sources. Most important to engineers is the Geological Survey, with its topographic mapping, water-supply records, conservation branch and straight geologic functions all expanding and recommended for faster growth by major engineering societies. Related is the General Land Office. It has given away most of the desirable land in the public domain but still retains administrative functions plus much mapping which is still unfinished. There is also the Alaskan Railroad to be put on a paying basis if possible.

These are all the branches directly of engineering concern. In addition, the Interior Department includes the Bureau of Education, purely a research unit, and some eleemosynary institutions in the District of Columbia. At present there is more pressure for a Department of Education than for any other form of federal reorganization. Several related units in other departments, according to one logical grouping, might form a social service organization. The bureaus for women's and children's welfare under the Department of Labor and the Public Health Service under the Treasury are mentioned in this connection. In a sense they are Interior functions, but it would be just as logical to place them under the Labor Department, which is recognized as needing expansion and reorganization. Such a disposition either under Labor or under a new department rather than under Interior would be essential if Interior is to be left open for engineering functions.

The main push toward a public works department seems to be shelved for some time, though efforts are being made to keep the issue alive. Such a group, under proposals advanced to Congress, would include Rivers and Harbors, Public Roads, perhaps the Weather Bureau, and other large units which are so firmly rooted that they are unlikely of transplanting without a long fight. For appropriational and political reasons there is strong inertia against the creation of new bureaus; much more against new departments. Similar considerations make it desirable in many respects to keep Public Roads, for example, in the Department of Agriculture, where it has received good support from the legislative branch.

But reorganization of the Interior Department on a less drastic scale is free from such major obstacles, with a tentative policy already mapped out. As told in past issues of *Engineering News-Record*, the public land committee has been working for some months toward a solution of Western problems under a preliminary outline sketched by the President and by Secretary Wilbur. The committee is instructed to report at Congress next December, at which time the taking of definite steps is certain of widespread support. Although the final plan may be to turn over the public lands to the states, it will be some time before the transfer can be consummated in all regions. Mineral rights and forests may be retained after most of the other surface areas are apportioned. In any case a new policy will mean a change in the technical functions of the Interior Department which are largely Western in character.

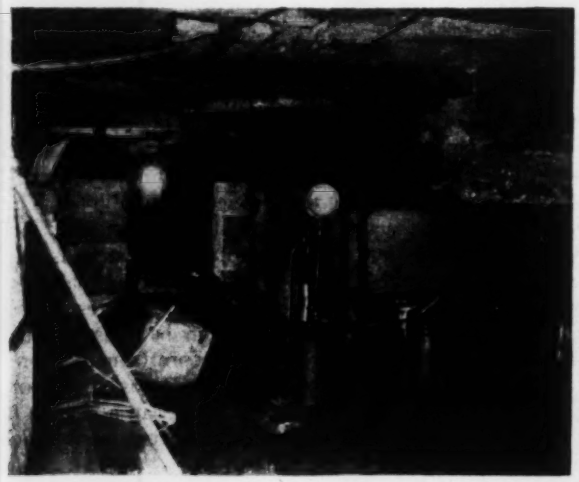
One suggestion is that the Forest Service would fit well with similar work of the Park, Indian and Reclamation services and that its transfer to Interior thus would be desirable. There is strong sentiment for the return of the Bureau of Mines, now with the Commerce Department. Senator Oddie has announced himself in favor of this change. Although the largest work of the bureau is in Eastern coal mines, it is pointed out that its oil and mineral work is of direct relation to corresponding activities of the Interior Department. Even without the transfer of these outside bureaus, a change within the Interior Department could effect the telescoping of old bureaus and the creation of new ones toward more efficient management. A Bureau of Surveys and Maps and a Bureau of Water are named as logical developments.

In the absence of definite plans, it is not possible even to guess just what changes will come. The problem is much more complex than the simple outline here given might suggest. Other units might be brought into the picture. Experts in governmental economy say that reorganization is a game of solitaire in which any one of a number of defensible combinations might be laid out according to personal judgment. Aside from logic, the political situation is another thing. At least the incentive toward action which is offered by the public land movement offers a chance toward progress pending the later building of a public works department.

# Foundation of Fourteen-Story Building Replaced Under Basement Floor

## Decay of Twenty-Year-Old Wood Pile Supports Remedied by Substituting Concrete Piers—Work Done in Cramped Quarters

A FOURTEEN-STORY building in the vicinity of Sansome and Bush Sts., San Francisco, was recently transferred from a foundation of 1,100 wooden piles to 210 concrete piers without disturbing the tenants of the building or causing any appreciable settlement. The reason for the change was the serious deterioration of the wood piles, driven in 1909. Steel cylinder caissons were sunk beside the old pile footings and the loads transferred to them by I-beam sub-grillages incased in concrete. Limited working space and the necessity of providing temporary supports during the shifting of each column load made the work extremely difficult, but the renewal was completed in seven months without accident.



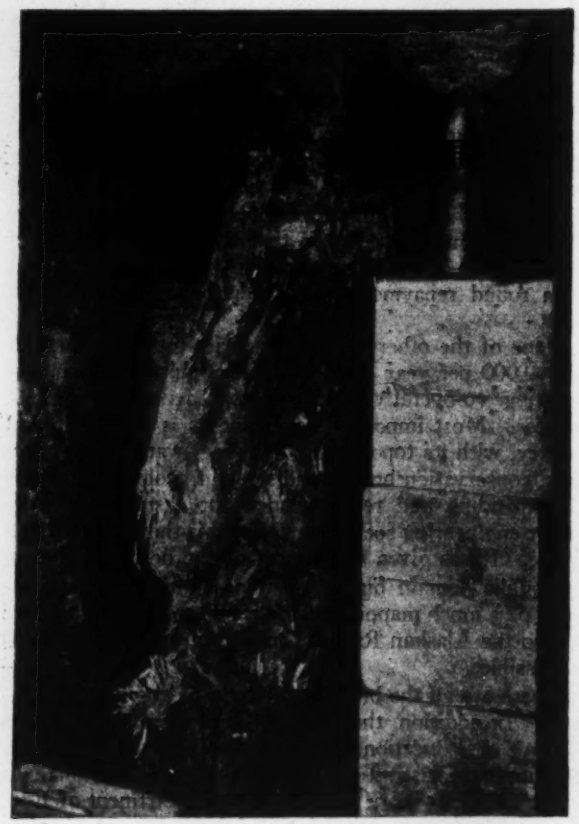
HYDRAULIC JACKS PLACE LOAD ON NEEDLE BEAMS
Excess of 25 per cent load applied at each end and shims driven.

When the building was constructed, about twenty years ago, the water table at the site was only a few feet below ground surface. Subsequently large buildings have been constructed on all sides, in many instances involving open foundation excavation unwatered to considerable depth. In addition, complete surface coverage by paved streets and roofs has gradually prevented rainfall from replenishing the local groundwater supply, with resulting continual recession of the water table from above original pile cutoff elevation to 9 ft. below this level. The pile heads accordingly had been above water level for many years and a large number showed evidence of decay, in many cases the bearing power of the pile being completely destroyed. Signs of termite attack also were noted on some of the pile clusters.

Another factor of importance in deciding the need for concrete supports was the discovery—revealed by further excavation around the pile heads—that many of the piles had been badly broken in driving, necessitating but little decay to render them unfit for service. A typical example of the numerous cases of overdriving is shown in an accompanying illustration and although the excavation uncovered only about the upper 6 ft. of their supposed 20-ft. length, approximately 25 per cent of the piles were found seriously damaged from this cause. In addition, excavation revealed that about 25 per cent of the total number of piles had penetrated only about 6 ft. into the fine compact sand.

### *Construction Procedure*

Access to the sub-basement area, about 140 ft. square, was obtained by excavating passageways in the material around the footings for a depth of approximately 10 ft. below the basement floor slab. The sand was easily shoveled into wheelbarrows and delivered to a bucket elevator that lifted it to a bunker on the sidewalk, from where it was removed by trucks. It was necessary to handle about 3,500 cu.yd. of material, but some of this was utilized for progressive backfilling and did not have to be removed from the basement. The basement floor consisted of an unreinforced-concrete slab 6 in. thick poured on the sand, making it necessary to erect a system of supports as the sand was removed. The concrete used in the reconstruction totaled about 2,000 cu.yd. and



OVERDRIVEN PILE, TYPICAL OF 25 PER CENT OF THOSE SUPPORTING THE BUILDING
Fibers in the pile could be traced through several S-turns.

enough of the excavated material which had been removed was brought back upon completion of the work to finish the backfilling.

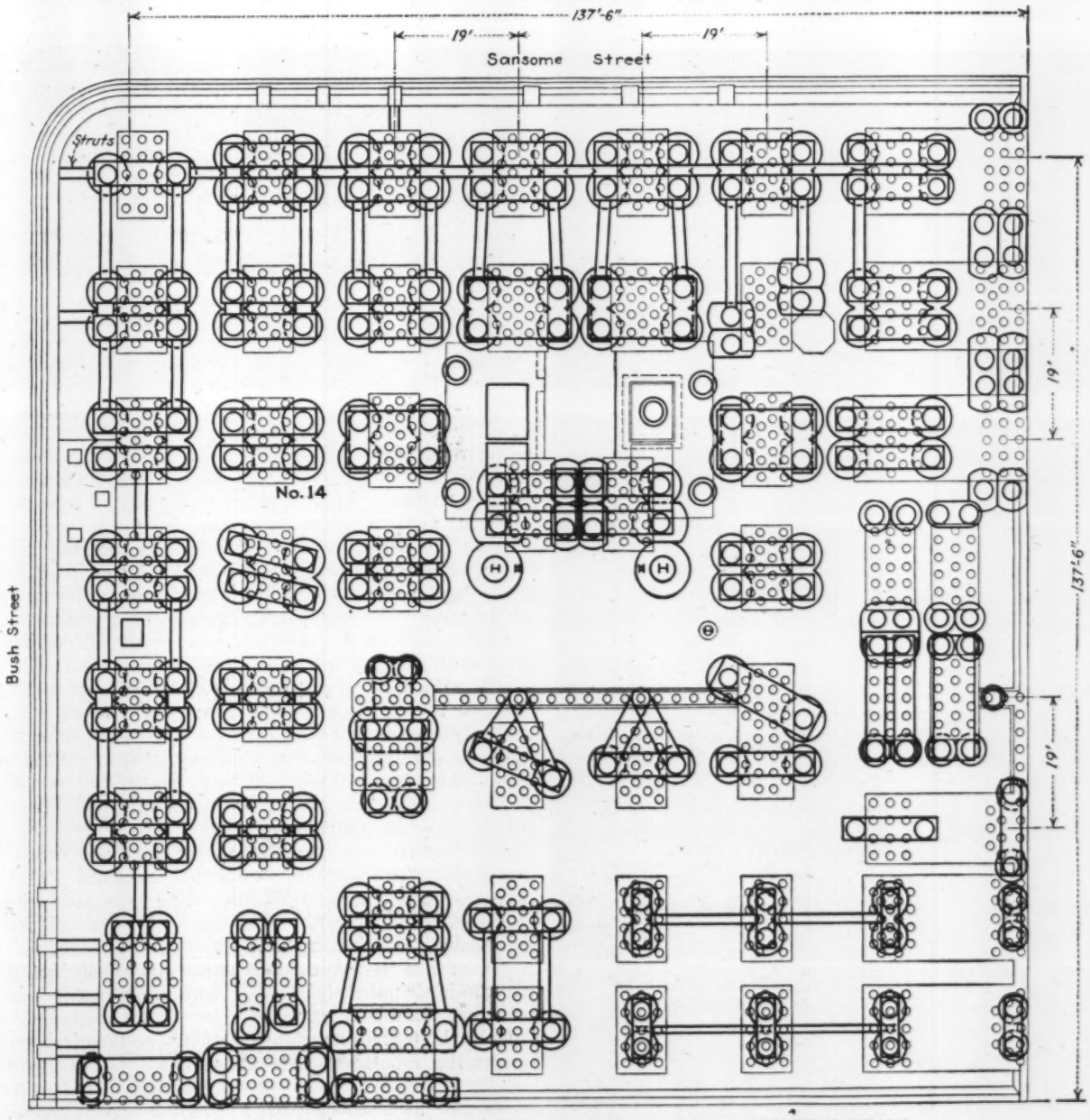
The untreated wood piles of the original foundation apparently were intended to be 20 to 25 ft. long and to be driven to bearing on a hard sandy clay. Each cluster carried a double grillage of 12- to 18-in. I-beams which supported the column and was incased in concrete that extended down over the pile heads for about 6 in. The size and shape of these footings varied with the column load; the thickness was approximately 6 ft.

The first plan for reconstruction called for the new supports to be sunk directly under the old footings. This required a major portion of the load to be carried on temporary supports and the complete pulling of many of the piles. Use of this method at the start under some of the smaller footings revealed several difficulties. The serious condition of the original piles necessitated building a very extensive system of temporary support when enough of them were removed to provide working space to sink the caissons. In addition, conditions under the footing for caisson work and for pulling the piles were cramped, which resulted in material delay to progress. As a result the plans were changed to permit sinking the caissons at the sides of the footings and transferring the load to steel needle beams.

### *Method of Sinking Caissons*

The caissons consisted of 2½-ft. lengths of ⅜-in. butt-welded steel pipe, chiefly in 32- and 36-in. diameters, although a few of larger sizes were sunk. Joints consisted of a 6-in. collar of No. 10 gage steel welded on the outside of the lower edge of each section. The inside surface of the collar was covered with soap to make the joint watertight.

In general, the method used in sinking the caissons was



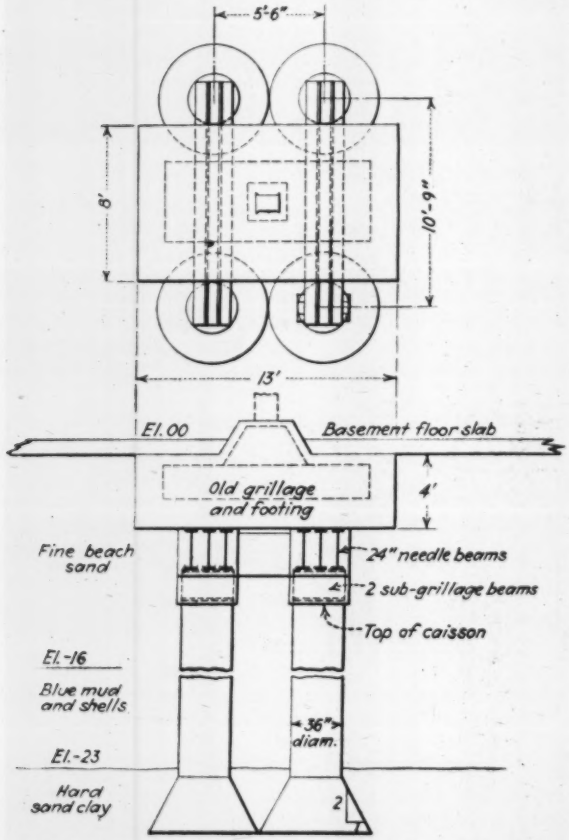

FOUNDATION PLAN, SHOWING FOOTINGS, CAISSONS AND CONNECTING BEAMS

the same, utilizing hydraulic jacks bearing against I-beams, placed temporarily under the old footings or against an improvised strut arrangement shown in an accompanying illustration. As each section was jacked down the material was removed by hand from the inside. Excavation was not permitted to be carried to the lower edge of the caisson during sinking, which maintained the surrounding ground in an undisturbed condition. The material penetrated by the caissons consisted of about 10 ft. of fine beach sand and 7 ft. of blue mud and shells (an old geological beach), below which layer they entered a hard sandy clay. At this stratum sinking was stopped and a bell was excavated in the dry to provide a base which was limited by design to twice the diameter of the caisson. The material excavated from the bell was so hard that air spades were required. The load allowed on this foundation material was 6 tons per square foot. A total length of about 4,000 lin.ft. of caissons was sunk to complete the work of renewal.

In several instances caisson sinking and belling operations encountered the lower end of piles in a horizontal position. This was thought to indicate that when the pile reached the hard stratum overdriving had broken it in the section which had the weaker lateral support of blue clay. Further driving, it was believed, resulted only in deflecting the tip and forcing it along the top of the hard stratum, although the driving crew probably thought deeper penetration was being secured.

### *Transferring Column Loads to Caissons*

To illustrate the general method used in transferring the column loads from piles to caissons, the various steps




SKETCH OF TYPICAL FOOTING SHOWING OLD AND NEW SUPPORTS

METHOD OF SINKING CAISSONS
Shell jacked down and excavated in 2½-ft. sections.

required at a typical interior column are outlined. Column 14 supports a load of 610 tons which originally rested on eighteen piles carrying a steel grillage incased in a concrete slab 8x13 ft. in plan and 4 ft. thick. The reconstruction plan called for sinking four of the 36-in. caissons beside this footing and transferring the load to them by means of I-beams placed under the old concrete after the piles had been removed.

Access to the under side of the footing necessary for placing the needle beams was obtained by temporarily taking part of the load on screwjacks and removing some of the piles. The jacks were supported on a grillage of timbers placed on the sand. In some cases where piles were badly decayed for some distance below the footing this rotted section of pile would be sawed out and a jack inserted to provide additional temporary support. No difficulty was experienced in these temporary means of support, although only the minimum number of piles required for the placing of one needle beam was removed at a time. One crew was detailed to check up and tighten all the jacks once a day.

The four caissons, located as shown in the accompanying sketch, were sunk by the method described. They were then belled out and filled in a continuous pour with 2,500 lb. concrete each. After seven days was allowed for setting, the caissons were ready to take the load.

On each of the two caissons at one end of the footing two 36-in. lengths of 20-in. I-beams were placed with sufficient space between them to permit the operation of a hydraulic jack. Enough of the piles were then removed under the footing to slide through one of the 24-in. needle beams on top of the sub-grillages. The jacks were then used to bring the needle beam up to contact with the concrete and steel shims were driven to form a

tight bearing. Jacking was continued until the gages on the pumps, which read in tons, indicated that each end of the beam was carrying 25 per cent in excess of its ultimate calculated load. Steel shims were driven with sledges to provide bearing between the ends of the needle beam and the sub-grillage beams. The jacks were then released and moved over into position for the second needle beam, and the process was repeated. The third beam under this end of the footing was brought to bearing in the same way; the work at this point is clearly shown in an accompanying view. The same method was used to transfer the load of the other half of the footing from the piles to the other two caissons.

Forms for concreting were built around this new grillage to provide a 4-in. coverage for all the new steel. This concrete included a reinforced beam connecting the ends of the needle beams along each side to increase stability. Pouring was done from the basement floor level through holes opened in the floorslab. Care was exercised in rodding the concrete to assure complete coverage for all parts of the steel.

The exception to the details described in the foregoing typical case were numerous and varied greatly, but the general method of load transference was the same. In some instances the amount of load required a complete layer of needle beams under the footing, which, in turn, necessitated long sub-grillage beams extending along the sides between the caissons in place of the short lengths. Certain small footings with light loads required only two caissons. In these instances stability is secured by reinforced-concrete beams connecting them to other footings.

The construction difficulties, resulting from the cramped quarters and limited working space, provided new problems for each part of the work. Care was required in laying out construction so that interference would be kept at a minimum. Handling the long, heavy I-beams by hand on rollers through the narrow passages without interfering with excavation or backfilling required careful planning. In one instance it was necessary to support a footing on the needle beams and then excavate deeper and cut off the piles again 4 ft. lower to provide headroom for transporting the beams to a more distant footing down through this passage as the only means of approach.

Following the concreting, backfilling was started and carried up to the basement floor. This backfill was carefully tamped and rammed to provide the bearing for the old floor.

Levels were run daily on all the columns at basement level throughout the construction period. No settlement was detected and occupancy of the building was carried on as usual during the construction period. A system of force and exhaust fans was used to secure proper ventilation in the working area.

The method of foundation renewal was developed and the work directed by H. J. Brunnier, structural engineer, San Francisco. The construction was carried on by Lindgren & Swinerton, Inc., of San Francisco, with Van W. Rosendahl superintendent.

# Reconstruction of Union Stations at Omaha, Neb.

## Two Separate but Independent Stations to Be Rebuilt and Connected by Concourse Over Tracks—New Track Layout

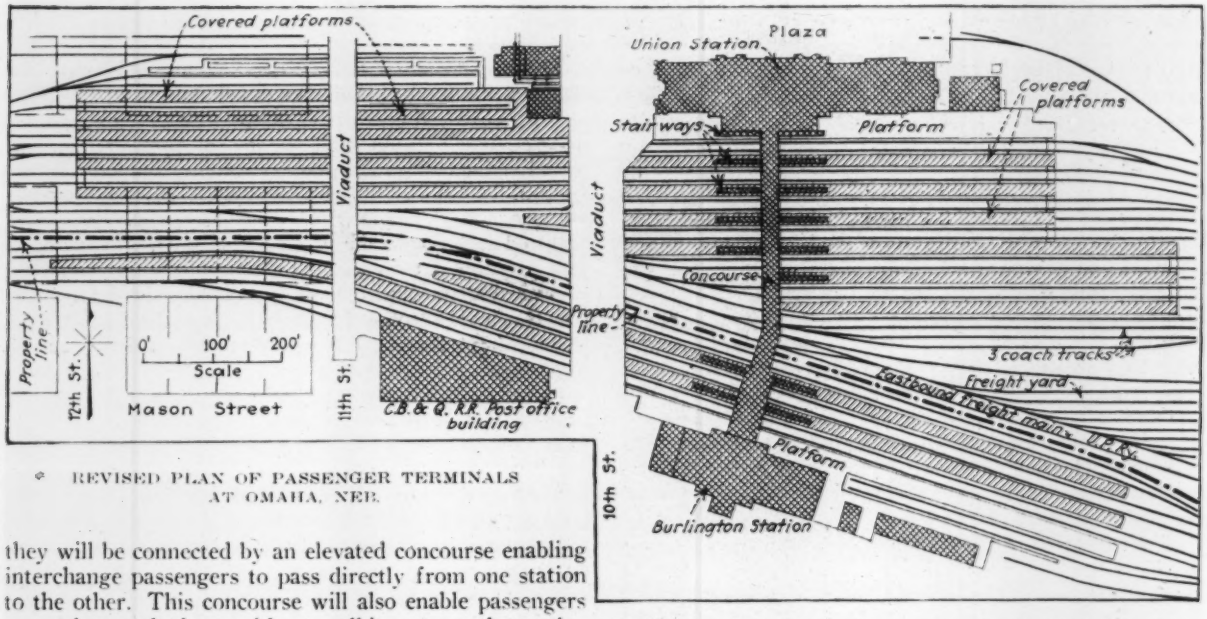
IMPROVEMENTS now under way on the railway terminals at Omaha, Neb., call attention to the unusual situation at that place, where two union stations face each other on opposite sides of the track layout. Both stations are entered from the Tenth St. viaduct, which crosses the tracks, but there is no direct connection between them. In the present revision the track layout will be altered considerably. The Union Pacific Railway will build a new station on its present site; the Chicago, Burlington & Quincy R.R. will make extensive alterations on its station, and the two stations will be connected by a concourse spanning the tracks and having stairways to the several platforms.

At the Union Station seven railroads are accommodated. These are the Union Pacific (as owner) and six tenant lines; the Chicago & Northwestern, the Illinois Central, the Wabash, the Rock Island, the Missouri Pacific and the Chicago, Milwaukee, St. Paul & Pacific. Their combined daily traffic approximates 52 trains inbound and 52 outbound. In addition to its own lines the Burlington station has only one tenant line, the Chicago Great Western. The daily traffic averages 25 trains inbound and 25 outbound, all but two each way being on the Burlington lines. In 1899, when these two stations were new, the total traffic was about 80 trains daily, 60 of which used the Union Station. At that time the population was about 140,500, while it is now about 225,000.

*Historical Summary*—The original station was a frame structure built about the time of the completion of the Union Pacific Ry.—the first transcontinental line. A union station for the Union Pacific, the Burlington and other lines was proposed in 1889 by the Omaha Union Station Co. and was backed by the two main railways and assisted by a city bond issue. The site was to be on the opposite side of the tracks from the old station and work was started in 1890. A controversy with the city arose in regard to the new plans, and repudiation of the bonds was threatened; financial difficulties came at about the same time and work was stopped, the project being finally abandoned. At that time the location was on the outskirts of the city and in 1896 there was some public agitation for a more central location, the general plan being for a dead-end station as at St. Louis, with all through trains backing in or out on Y-connections. This project, however, did not pass beyond the paper stage. In 1897 the unfinished structure begun in 1890 was torn down, but in 1898 the Union Pacific built its present station on that same site.

Meanwhile, the Burlington had proposed a union station in 1897, but as other roads had agreed to use the new Union Pacific station it decided to proceed alone and so built its own station on the other side of the tracks, practically on the site of the original Union Pacific station. These two stations were described in *Engineering News* of May 4 and June 1, 1899, pp. 278 and 344. It is of interest to note that while the Union Station had the main passenger facilities on the upper or viaduct level, the Burlington station had them on the lower or track level.

*Revised Plans, 1930*—In the revision now being carried out, the two stations on opposite sides of the track layout will continue to be operated independently, but will constitute what might be called twin stations, since




REVISED PLAN OF PASSENGER TERMINALS AT OMAHA, NEB.

they will be connected by an elevated concourse enabling interchange passengers to pass directly from one station to the other. This concourse will also enable passengers to reach any platform without walking across the tracks, as is necessary at present.

The track layouts also are independent but with crossover connections to provide for any interchange movements. It will be seen from the plan that a complication in preparing this layout was the fact that the two railways come together at an angle at the east end but proceed parallel beyond the west end. The present double-track approach from the Missouri River bridge will be widened for four tracks. In the arrangement shown the Union Station on the north side will have thirteen tracks (for 7 to 22 cars each) served by six covered island platforms, instead of the present nine tracks for 8 to 13 cars each. At the west end there will be three additional stub tracks and three platforms, which will be used probably for short branch-line trains and for setting out sleeping cars. Tracks will be of the usual ballasted construction and arranged in pairs spaced alternately 12 ft. and 27 ft. 3 in. c. to c. For the Burlington station, on the south side, there will be six tracks (instead of three as at present) and two island platforms with alternate spacing of 13 ft. and 27 ft. c. to c. for the tracks.

As to the station buildings, the Union Pacific will have an entirely new structure on the present site, with a broad plaza and parking space on the north side. All main passenger facilities will be on the upper floor level with the concourse and the viaduct. Its main waiting room will be 76x160 ft. During construction traffic is being handled at a temporary station south of the present Union Pacific tracks. The Burlington station will be retained but will have extensive alterations, especially in transferring the passenger facilities from the lower or track level to the level of the viaduct and concourse. Its new waiting room will be 80x80 ft. In both stations the baggage, mail and express will be handled on the lower or track level and at the ends of the station so that there will be no trucking on that part of the platforms used by passengers.

*Engineers and Architects*—These new plans were prepared under the direction of H. C. Mann, chief engineer of the Union Pacific Ry. system, and A. W. Newton, chief engineer of the Chicago, Burlington & Quincy R.R., with F. T. Darrow, assistant chief engineer at Lincoln, Neb., in direct charge. For the station buildings the architects are Gilbert S. Underwood for the Union Pacific, and Graham, Anderson, Probst & White for the Burlington. The approximate cost for the completed stations is estimated at $3,500,000 for the Union Pacific and $700,000 for the Burlington, or a total of $4,200,000. It is expected to have all the work completed early in 1931.

## Survey of Research Facilities in the Protective Coating Field

A survey of research work now being carried on in the field of protective coatings, initiated by the paint and varnish division of the American Chemical Society, has been made by this body in conjunction with committee D-1 of the American Society for Testing Materials, the Federation of Paint and Varnish Production Clubs and the scientific section of the educational bureau of the American Paint and Varnish Manufacturers' Association. In December, 1929, a letter and questionnaire were distributed asking for data which would show the approximate distribution of available research facilities among (1) paint and varnish manufacturers' laboratories; (2) raw material laboratories; and (3) university, government or other laboratories. From the answers submitted it was determined that the paint and varnish manufacturers have a total available man power of 627, against 233 in the two other divisions. However, the ratio of man power on research work is 240 as against 119, which would indicate that the manufacturers, with a few notable exceptions, are not employing enough of their chemists' time on work properly classified as research. Several university and government laboratories are interested in research problems of interest to the field of protective coatings. The failure of paint and varnish manufacturers to publish the results of research work and to indicate the present status of the problems faced is believed to account for the failure of the industry to enlist more universities in this type of work. The complete report of the committee has been published as circular 365 of the scientific section, educational bureau, American Paint and Varnish Manufacturers' Association.

# New Machines Developed for Work on Irrigation Ditches

## Excavator That Digs 8-Ft. Ditch for $600 Per Mile and Efficient Ditch Cleaner Devised by Imperial Irrigation District

A WHEEL excavator for small ditches and a new type of ditch-cleaning machine have been developed by the engineers of the Imperial Irrigation District of California. The excavator was designed for digging private drains which would be too expensive for land owners if dug by the usual equipment. Excavating costs as low as 1½c. per cubic yard have been reported and average costs run about 2½c. per cubic yard. The cleaner supplies a need for an improved method of removing silt and weeds from small ditches; the district cleans about 3,000 miles of ditch per year, which requires both fast and economical work.

*Excavator*—The ditching machine is a wheel excavator, with a 21-deg. horizontal swing to the excavating wheel. The 16-ft. wheel is equipped with thirteen buckets which move at an excavating speed of 55 buckets per minute. They are of special curved shape designed for self-cleaning. The rate of excavation is about 7 cu.yd. per minute, and the material is discharged onto a conveyor belt 20 ft. long and 30 in. wide, running at a speed of 240 ft. per minute.

The machine has a 90-hp. gasoline engine, weighs 65,000 lb. and is mounted on two crawler treads 30 in. wide, one 16 ft. long and the other 8 ft. long. The gage of the treads is 15½ ft. when closed to a minimum for traveling; it can be extended to 28 ft. for spanning ditches when at work. A crew of two men is required, and any size of ditch may be dug up to 8 ft. in depth. Four trips of the machine usually are required to produce a finished ditch 8 ft. deep, 15 ft. wide at the top, and having a rounded bottom 4 ft. wide. The side slopes are produced by the swinging of the wheel as indicated in the accompanying illustration.

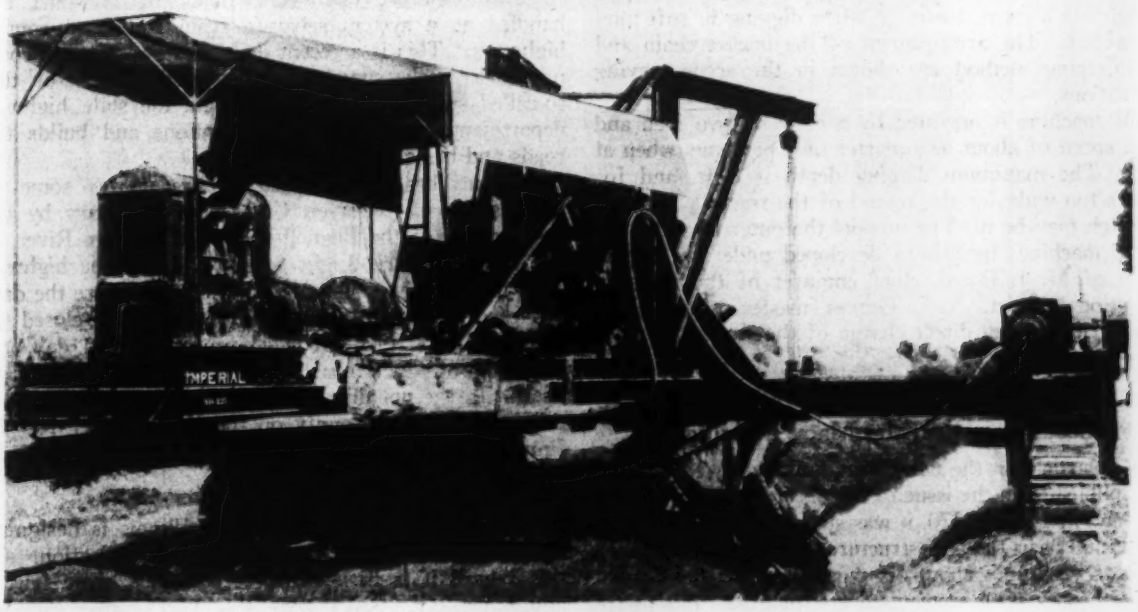
EXCAVATOR DIGGING IRRIGATION DITCH
Horizontal swing of wheel provides for side slopes.

Three of these machines are in use at the present time and have proved extremely economical. The average cost of an 8-ft. ditch is about $600 per mile and for a 6-ft. ditch with a 12-ft. top it is $450 per mile. On a basis of yardage, the cost of material removed, measured in place, varies from 1½c. to 3½c. per cubic yard.

*Cleaner*—The machine to clean the silt from small lateral ditches is a bucket-type excavator operated by gas-electric drive. A 30-hp. gasoline engine operates two small generators which provide power for five separate motors operating various parts of the machine.

The bulk of the weight is carried on a main crawler tread 20 in. wide and 12 ft. long, and an auxiliary tread, 6 ft. long, is provided to travel on the opposite side of the ditch. Each crawler is propelled by a separate motor and, under ordinary operating conditions, the two move at the same speed with the gage constant. However, the operator is able to vary the gage to conform to conditions of ditch bank by pointing the outer track out or in. The limits of gage width are 12 ft. and 28 ft. Separate motors provide for digging, for raising or lowering the end of the bucket chain and for adjusting its lateral position.

The bucket chain operates at a speed of between 50




DITCH CLEANER WITH SPAN ADJUSTABLE DURING OPERATION
Separate electric motor permits outer track to be directed on ditch bank.

DOUBLE DUMPING BUCKET CHAINS
Tipping bucket forward and then over backward assures emptying of sticky silt.

and 70 buckets per minute. A special arrangement of the chain provides for a double dumping of each bucket. Leaving the ditch bank fully loaded, the bucket is first tipped forward and discharges part of its load into a chute onto the ditch bank. It then passes over a second sprocket, is reversed, and empties the rest of the load out of the back side.

This arrangement has proved particularly effective in securing a clean discharge when digging in soft mud and weeds. The arrangement of the bucket chain and the dumping method are shown in the accompanying illustrations.

The machine is operated by a crew of two men and has a speed of about one-quarter mile per hour when at work. The maximum digging depth is 8 ft. and for ditches too wide for the spread of the track, a barge in the ditch may be used to support the outer track.

The machines have been developed under the supervision of M. J. Dowd, chief engineer of the Imperial Irrigation District. A. L. Graves, master mechanic for the district, was in direct charge of the work.

## Cost Figures on the Macy Building

In an article on the new Macy building in New York City, published in the issue of *Engineering News-Record* for Sept. 4, 1930, p. 370, it was stated that when figured on a rental basis the new structure would cost per square foot per year only about 3c. more than for floor space in the then-existing sixteen-story structure. This figure for the additional cost was wrong due to a typographical error. It should have been 81c.

# Some Current Highway and Highway Bridge Activities

FROM AN EDITOR'S NOTEBOOK

THERE has been no business depression in the state highway departments. On the contrary, the organizations in Missouri, Illinois, Indiana and Ohio, for example, are leaving former records far behind. Missouri is doing $32,000,000 of work, against $24,000,000, the previous largest total; bridges under way comprise $6,000,000 of the total. About July 15 Illinois placed under construction the last section of its 800-mile budget for 1930. Illinois started its 1930 program a month late because gas tax money was not available until February. However, gas tax money is building all of this 800-mile addition. Bonds or gas tax, Illinois builds its share of the nation's highways every year.

Indiana's road program in 1929 totaled approximately $21,000,000; this year there is available 1c. more of gasoline tax than was available last year, and all of this additional revenue is going into construction. Whereas Illinois does not spend anything for maintenance until a new road is finished, the whole Indiana system, improved or unimproved, is under state supervision, and maintenance charges on old structures consequently constitute a continual drain on the coffers.

In Ohio the current program involves 75 per cent more work than has been done in any other year; included in this program are 300 bridges of more than 20-ft. span, representing a total cost of about $5,000,000.

## HIGHWAY NOTES

### *Missouri*

Missouri's $32,000,000 program—representing the first inroad on the proceeds of a $75,000,000 bond issue—is being turned out of a palatial new highway department building completed about a year ago. With four floors of offices and an extensive material-testing laboratory in the basement, it is one of the best-equipped headquarters plants in the country. The building is situated on the state Capitol grounds.

Farm-to-market or feeder roads in Missouri are handled as a system separate from state and county highways. This is a recent development. County commissioners make suggestions for locating roads on this so-called supplementary system, and the state highway department fixes the definite locations and builds the roads and bridges.

Missouri has a high-speed job under way some 40 miles south of Jefferson City, made necessary by the construction of the Bagnell dam on the Osage River by the Union Electric Light & Power Co. The highway must be relocated and three bridges built before the dam is closed in June, 1931. To see that it is closed on schedule, 2,500 men are working 24 hours a day. A state highway will also cross on the top of the dam itself. In the not distant future another power project, this one in Stone County on the White River for the Empire Utilities Co., will require further relocation work.

### *Illinois*

For the first time in its history Illinois is designing its pavement concrete to a strength specification. In this regard it is in very select company, since few if any other states have gone this far in concrete slab design. Excellent results, as measured by core tests, are reported; predicted strengths are being realized.

One corollary phase of this new method of concrete design is especially attractive to the contractor: the state will tell each prospective bidder the yield he can expect from his concrete mixture if he will submit samples of the stone and sand he proposes to use. Thus the bidder's cement factor is removed from the variables in his estimating.

Trends in Illinois seem to point to the probable use of bulk cement in the field. Some sort of mobile bins and batchers will be necessary, that can move along with the paver. A few equipment manufacturers already have this possibility in mind.

## BRIDGE NOTES

### *Missouri*

Missouri's state highway bridge department has never been busier. Approximately 190 designs for structures 50 to 400 ft. long have been turned out so far this year from the office of N. R. Sack, the state bridge engineer. Naturally, much of this work is standard, involving I-beams or deck trusses for 24- to 50-ft. spans, pony trusses for 50- to 100-ft. spans and through trusses for 100- to 200-ft. spans. Incidentally, the bridges on the new supplementary system of feeder roads present one of the largest current problems in the department.

Bridge contracts in Missouri annually amount to about one-fifth of the total highway money spent (bridges are defined as stream crossings of more than 12-ft. spans).

Missouri permits no shop paint on steel for bridges. Poor shop painting and the collection of dirt and cinders on the members before erection brought about the practice. Let it rust during erection is the modern idea. Sand blasting comes to the rescue when erection is complete. Painting on the sand-cleaned surface consists of the application of a first coat of red lead, a brown second coat containing some graphite, and a gray third coat of lead carbonate. Painting is done by state forces or under special contract, whichever proves more economical.

The bridge department is busy on designs of grade-separation structures to be placed on a new system of radiating roads and belt lines at Kansas City and St. Louis. Six or eight types of structure, each basically different, have been designed and the bridge for each definite location will be selected from these master designs.

### *Illinois*

The inconsistencies of the War Department regarding clearances for bridges are not confined to the seaboard streams. Three important crossings of the Illinois Waterway present as many horizontal and vertical clearances. Ships which can get in at one end cannot get out at the other. This variability may be necessary and inevitable because of special conditions, but it is stimulating to consider whether or not some standards could not be set, to the advantage of all concerned.

George Burch, bridge engineer of Illinois, is pleased that his Dixon Springs concrete arch was "in the money" in the Am. Soc. C. E. awards for architectural merit, because it represents no unusual departure from typical Illinois bridges. A pleasing appearance is an important design consideration on every highway bridge that is planned.

NEW MISSOURI STATE HIGHWAY DEPARTMENT BUILDING AT JEFFERSON CITY

On its bridge work Illinois has gone to skeleton piers and open abutments wherever possible. All the solid abutments, built to retain a fill, have cracked or otherwise proved unsatisfactory. Open and counterforted abutments let the fill run through. Another innovation is the use wherever possible of concrete piles instead of resorting to deep excavations for piers and abutments.

Deck girders are more economical than through girders. With the rapid increases in traffic and consequent necessity for widening roadways, through-girder bridges have too short life. Deck-girder bridges can be widened as easily as can a pavement, by merely adding another line of girders and extending the slab.

Illinois is an advocate of shop paint on its steelwork. This is a sublimed blue lead furnished to the fabricator

by the state and amounts to ½ gal. per coat per ton of steel. The field coat is white lead.

### *Indiana*

Indiana is far ahead of any other year in volume of highway work. Considering bridges alone, 1930 will see the expenditure of $2,000,000, against less than $1,500,000 in 1929. Contract payments of $275,000 in May were 2½ times as great as any previous May. Fred Kellam, the state bridge engineer, has under construction at the present time approximately 125 bridges, including twelve grade-separation projects.

Psychology plays an important part in the design used on Indiana bridge approaches. Handrails are flared about 3 ft. at the ends of the bridges, giving the appearance of a wide roadway. Such structures have figured in virtually no collisions, whereas the old straight handrail bridges have a serious accident record. Incidentally, the finish of the handrails is pleasing—bush-hammered panels with carborundum-finished borders.

The subject of interstate bridges is an important one in both Indiana and Illinois. Plans have been completed for an Ohio River bridge at Evansville and for Wabash River bridges at Vincennes and Mount Carmel. It is probable that contracts will be let soon for the Mount Carmel bridge and that the Vincennes bridge will be offered to bidders in late winter or early spring.

The Vincennes bridge, first designed in steel by the Illinois highway department, has now been redesigned by Indiana as a series of open-spandrel concrete arches (five main and two approach spans), planned as a memorial structure. An interesting feature of the bridge is that the entire grade line, 1,200 ft. long, is a parabolic vertical curve. The bridge proper is almost entirely on the vertical curve, although one of the 5 per cent approach grades comes up a short distance on one of the approach spans. The use of this long vertical curve permits the rise to span ratios to be practically equal for spans of 180, 170 and 145 ft. The cost is 15 per cent more than for the steel structure. The Mount Carmel bridge, designed by the Illinois department, is to be of steel.

Grade-elimination projects continue to form a good nucleus of work in Indiana. Twenty-six structures have been completed, twelve are under construction or agreement, eleven projects are being negotiated and fifteen are pending. Nine-tenths of the grade-separation structures are concrete beams and girders on concrete bents. Where spans exceed 45 ft., however, steel trusses or plate girders are utilized. Open abutments are the rule.

In the use of open abutments on grade-separation projects retaining walls are not used to confine the fill, but additional span is provided so that the toe of slope will fall beyond the clearance limits on the railroad. This type of structure has not yet been used on a highway grade separation, since in all cases considered thus far the economics are in favor of solid abutments.

### *Ohio*

Do state highway engineers know as much about their bridges as railway bridge engineers? They don't, but they should, in the opinion of J. R. Burkey, chief engineer of bridges of the Ohio department of highways. Consequently, he has four parties in the field studying the bridges and railroad crossings on 11,000 miles of highway. Making 14 or 15 miles a day, this survey will cost about $30,000, and when it is completed Ohio highway bridges will be catalogued, indexed and analyzed. If it is desired to transport a road roller from Middletown to Cleveland, it can be routed over structures that will carry it. When money becomes available to repair old bridges, the most important and needy structures can be readily located on the visible record cards.

What constitutes a grade elimination, and how should its cost be allocated? Ohio thinks its law sets this forth more clearly and more fairly than that of any other state. Elimination may be accomplished either vertically or horizontally. For instance, on a railroad grade elimination, either the railroad or the highway may be depressed or elevated, or the highway may be so relocated that it merely parallels the railroad without crossing it. The latter is as much a grade elimination as the others, according to Ohio law. In all cases the railroad company pays 50 per cent of the cost of the necessary work.

Two high-level viaducts crossing the B.&O. Railroad and Cuyahoga River southeast of Cleveland will soon be under contract. They are 1,200 ft. long, 140 ft. high and in many respects similar to the well-known Ashtabula viaduct.

At grade-separation hearings both necessity and expediency have been required to be proved—necessity for the improvement and expediency on the part of the railroad company to undertake the work. Ohio is hailing a statement by railroad counsel at a recent hearing that hereafter proof of necessity will be waived. Necessity for removal of every grade crossing is recognized by the railroad. It appears to be a logical and sensible means of reducing costs of hearings, to say nothing of useless legal verbiage. Expediency is the real and only test for determining upon construction of a grade-separation structure.

# *Letters to the Editor*

### *Am.Soc.C.E. Membership Qualifications*

Sir—The writer has noticed the letter from C. J. Tilden in your issue of Sept. 11, 1930, commenting on the proposed amendment to the constitution of the Am.Soc.C.E. Because of objections precisely similar to those stated by Mr. Tilden, the writer felt constrained to vote "No" upon the amendment, although he was in favor of most of the items contained therein. Unfortunately, no opportunity was given to vote upon the different items separately.

FRANCIS P. WITMER,
Director, Department of Civil Engineering,
University of Pennsylvania.

Philadelphia, Pa.,
Sept. 17, 1930.

### *Settlement of Earth Dams*

Sir—I have read with great interest the article "Long Period Settlement Records of Two Earth Dams" by J. Albert Holmes (*Engineering News-Record*, Nov. 14, 1929, p. 769). There are certain points in this article which are not quite clear to me and I shall be obliged if you will please enlighten me about them. These are:

1. How is the seepage rate determined?
2. How is the effective size of the several types of materials determined?
3. What is the actual amount of settlement in the entire depths of Somerset dam and Davis Bridge dam in Tables II and III?
4. What is the significance of the expression "Settlement—Percentage of 1 per cent of depth of fill?" Does it mean $\frac{d}{H} \times 100$, where $H$ = total settlement in feet up to any particular depth $H$ of fill?
5. With reference to the remark in the concluding para-

graph of the article, viz.: "In the matter of permitting trees to grow on an earthen dam, the result when the growths have become large and old has been detrimental in most instances," will you please let me know what is the usual practice in the United States of America in regard to the growth of trees on earthen dams as a protection against wave wash?

Quetta, June 7, 1930. RAI BAHADUR FATEH CHAND. V. LAKHANI, Executive Engineer, Irrigation Dept., Baluchistan, India.

* * *

Sir—To answer satisfactorily the first question in the above letter, reference must be made to several articles on the subject describing apparatus and methods in detail. In general, the method is to place the material under investigation in a tank and apply water at the top, allowing it to flow through the material and measuring the loss of head by means of vertical glass tubes introduced near the top and bottom of the sample, or to catch and measure the amount of water passing through in a given time. Allen Hazen devised and used such apparatus previous to 1892 to determine the physical properties of sands and gravels for filtration for the Massachusetts state board of health. The publication of the board containing Mr. Hazen's report is now out of print. This method and apparatus were also used in the investigation of materials encountered and used in the construction of the north dike of Wachusett Reservoir, Mass. (*Trans.*, Am.Soc.C.E., XLVIII, 1902, p. 269) and in subsequent investigations. At the Bridgewater (N. C.) dams, and also in other investigations, the method of measuring the amount of flow, instead of the loss of head, was used (see "Some Investigations and Studies in Hydraulic-Fill Dam Construction," *Trans.*, Am.Soc.C.E., LXXXIV, 1921, p. 331). By Darcy's law, the rate of flow or seepage through a porous material is directly proportional to the pressure or head and inversely proportional to the thickness of the material. The temperature of the seepage water is important in arriving at correct results. A rise of temperature of 30 deg. F. increases the seepage rate 50 per cent. The formula for reducing to a uniform temperature of 50 deg. F., or 10 deg. C., is: Quantity passing at 50 deg. F. equals measured quantity times $\frac{60}{T+10}$ where $T$ is the temperature, in degrees F., of the water passing the sample.

2. Effective size is the size of grains in materials than which one-tenth of the sample is finer and nine-tenths coarser. The finer one-tenth controls the seepage rate.

3. Maximum and minimum settlements for both Somerset and Davis bridge dams were given in the article of Nov. 14, 1929, on p. 771. The actual settlements at each benchmark were as follows:

| Somerset Dam Over Period of 14.89 Years | | | Davis Bridge Dam Over Period of 4.81 Years | | |
|---|---|---|---|---|---|
| Benchmark | Depth, Ft. | Total Settlement, Ft. | Benchmark | Depth, Ft. | Total Settlement, Ft. |
| 1 | 23 | 0.11 | Sta. | ... | ... |
| 2 | 19 | .50 | 3 | 44 | 0.005 |
| 2a | 41 | .49 | 4 | 58 | .155 |
| 3 | 57 | .72 | 5 | 78 | .21 |
| 4 | 60 | ... | 6 | 96 | .275 |
| 5 | 63 | .38 | 7 | 121 | .325 |
| 6 | 60 | .59 | 8 | 143 | .47 |
| 7 | 68 | .52 | 9 | 192 | .575 |
| 8 | 73 | .67 | 10 | 216 | .595 |
| 9 | 60 | .44 | 11 | 175 | .515 |
| 10 | 83 | .76 | 12 | 105 | .35 |
| 11 | 100 | .87 | 13 | 57 | .20 |
| 12 | 91 | .69 | | | |
| 13 | 59 | .47 | | | |

It should be borne in mind that the first records of settlement were not taken until about eight months after completion of each dam and therefore do not show the total settlement following completion, nor do they show the amount of settlement that took place during construction. For this reason Tables II and III were worked out on a time-rate basis. The averages, given at the bottom of the tables, are attempts to arrive at the average rates of settlement at the ends of the periods given. These average rates are used in plotting the settlement curves. The maximum and minimum rates are also plotted.

4. The statement in the settlement Tables II and III, "Per cent of 1 per cent of depth of fill" should be "Per cent of depth of fill." The formula given in the question is correct.

5. Trees are not planted on earth dams in the United States to prevent erosion by wave action. Such protection is secured by revetments of stone pavement or riprap, heavy gravel or concrete slabs. In the United States where tree growths have encroached on smaller earthfill dams and dikes, their roots have penetrated the dam and opened up waterways. Channels left by decayed roots of dead trees permit still greater quantities of water to enter. British irrigation engineers in Ceylon have found that the roots of great trees growing on the bunds loosen the earth in heavy winds. Their practice in restoring the ancient bunds is to remove all trees.

Somerville, Mass., July 14, 1930. J. ALBERT HOLMES, Hydraulic Engineer.

## *Prior Use of Guy Derricks*

Sir—Referring to your most interesting article in your issue of Aug. 28 on "Guy Derrick Erection of Steel Bridges," in which the use of guy derricks is referred to as being quite original, the inclosed photograph may be of interest, as

GUY DERRICK ERECTING RAILWAY SPAN IN 1914

it shows the use of a guy derrick for erecting a 200-ft. span in 1914.

The Dominion Bridge Co. has, on several occasions, resorted to the use of guy derricks when it is important that the loads from the erection equipment be kept as low as possible.

Montreal, Canada, Sept. 9, 1930. F. P. SHEARWOOD, Chief Engineer.

## *Tight Plans for Highway Grading*

Sir—Mr. Purington's letter on the needlessness of laying down a tight grade on grading operations interested me greatly. For several years I had added gray hairs to my head trying to grade a road according to quantities and balances figured on plans, and then later on making another brave attempt to secure the figured grade line for the finished pavement. And yet I am not so sure that Mr. Purington's method is the way out of the wilderness.

For first of all, the contractor would not have a good enough estimate on which to base an intelligent bid. It is true that on a park system curves and grades are not the important criteria, but on main highways one is restricted to certain steepness of grade or sharpness of curve according to the required standards of safety and economy, and therefore a certain amount of excavation is necessary. To guess at this amount in any sort of rolling country is quite a job and is bound to have considerable error. To add further to the difficulties of such estimating, if one should encounter solid or intermediate rock classification it would be almost imperative that some sort of a balancing of quantities be done, with of course a previous investigation of field conditions, to arrive at anywhere near a proper knowledge of the quantities required for the grade line in mind; otherwise an error would result. Thus, if the estimated figure proves too low, the contractor makes a large profit on his unit bid price and the taxpayers suffer. If the figure is too high, the contractor loses money on his low unit price, does not pay his

bills, and the taxpayers suffer anyway. In either case Mr. Purington's object is defeated.

I have seen several roads graded by eye and when finally completed the most noticeable feature was the frequency of waste piles and small borrowpits along the right-of-way. Evidently when the paving was put on they had either too much or too little dirt to make any sort of an easy riding grade. Certainly one of the aims of modern highway engineering is to build a road with as sightly an appearance as possible. The waste banks and borrowpits in these cases stand out as so many engineering errors.

Highway departments today do make an effort to study grade line economics. Usually an attempt is made to keep within a certain limit haul, except where safety conditions or steepness of grade require otherwise. It seems to me that the effort should be made in that direction—a more thorough study of field conditions, a better knowledge of soils and their characteristics, and a keener understanding of contractor's equipment and their economic adaptability to the conditions involved.

MARK SAGAL.

Brooklyn, N. Y.,
Sept. 8, 1930.

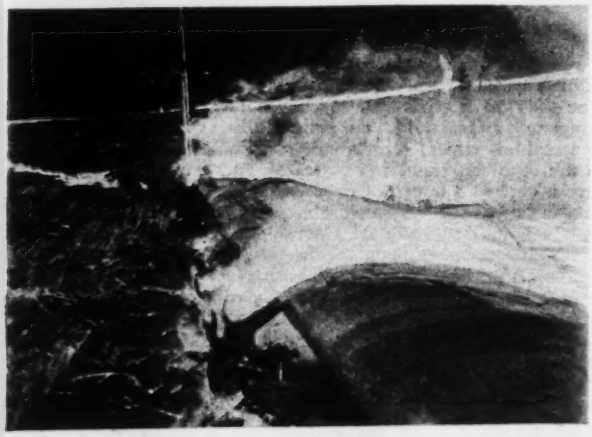
## *Siphon Failure in Alaska*

Sir—The inclosed picture shows the collapse of 1,000 ft. of ⅜-in. lock-bar pipe 46 in. in diameter on the inlet side of Belle Creek siphon under a head of 390 ft. This siphon, one of fifteen, is a part of the Davidson Canal system, which is 80 miles long and furnishes water for gold dredging operations of the Fairbanks Exploration Co. near Fairbanks, Alaska. It was completed in 1927.

The practice is to operate in the summer and drain the siphons in the fall. Drainage is by means of a 10-in. valve at the lowest point. The collapse in this siphon, as in three others which occurred at the same time, was due to the failure of the operating staff to exercise caution in their drainage. The only damage was flattening of the pipe, with no displacement of the pipe in any direction, which showed, possibly, that the siphon was adequately anchored.

In the fall of 1928 water was passed through the siphons after freezing had begun, so that ice had begun to flow through them. During drainage the ice accumulated on the surface of the receding water surface until it formed a seal which produced the vacuum causing the failure. The designers of the siphons had foreseen this condition and had placed 1¼-in. screw plugs in each 30-ft length of pipe, so that in case an air seal like the above mentioned should occur, a sufficient number of these plugs could be removed to break the vacuum.

The siphons were repaired by heating with wood fires on the outside and jacking inside the pipe to bring it out into circular shape. So successful was this method that there were practically no leaks when the siphons were put into operation in 1929. Needless to say there were no siphon failures in the fall of 1929. The lesson had been learned.



HEATING COLLAPSED SIPHON BEFORE JACKING

The siphons were designed and constructed under the supervision of G. W. Rathjens, chief engineer, with the writer assisting.

GEORGE I. UITTI,
Licensed Structural Engineer.

Chicago, Ill.,
July 14, 1930.

## *Good Painting Protects Steel Frames*

Sir—The value of the use of good paint is best emphasized by results obtained from examination of a building built four years ago.

A very tall structure of fireproof construction, the 40-story Court and Montague Building in Brooklyn, had its columns and girders exposed for an alteration after standing only four years and it was found that all the paint had come off and the steel had begun to show corrosion. There is only one way to account for this condition, and that is that the specifications were not lived up to and the general contractor, to save money, permitted the structural steel contractor to work in his own way.

As an example of good paint applied I can mention the Prudence Building, at 43d St. and Madison Ave., New York City. The present Prudence Building is a combination of the old Charles Building and the new structure to the south of its corner building. The old Charles Building, at the southeast corner of Madison Ave. and 43d St., was built 30 years ago. Six years ago, to alter the building and make the new addition, it became necessary to strip the columns. The writer, as engineer for the Prudence company, found the paint on the columns and the structural steel in such good condition that it looked as if the paint had been put on the day before.

It is my opinion that all fireproof buildings should be supervised by the architect or engineer in order to assure proper construction and guarantee the results sought for by the design. One cannot obtain good results when the dollar mark is the big factor and the builder is permitted to do as he pleases in order to save money here and there. It is such little matters, not thought of at the time, which shorten the lifetime of a building.

New York City,
Sept. 4, 1930.

DAVID M. OLTARSH,
Consulting Engineer.

## *Bad Practice*

Sir—On the front cover of the issue of *Engineering News-Record* of Aug. 21, you show a picture of two men "riding the falls." This is in connection with your article on the erection of the Empire State Building.

It is against good safety practice to have men ride the falls or the loads, and we think it a mistake to give a spectacular stunt of this sort publicity on the front cover of the leading civil engineering magazine, since it would seem to give engineering sanction to such practices.

New York City,
Sept. 11, 1930.

LEWIS D. RIGHTS,
Vice-President and Contract Manager,
Shoemaker Bridge Co.

Mr. Rights is entirely correct and justified in his criticism of this cover. It was a mistake to use it. The picture was no doubt specially posed, since there are also rigid rules in New York against riding derrick falls.—EDITOR.

## *Steel Used in Chicago's Merchandise Mart*

Sir—On looking over the Aug. 21 issue of *Engineering News-Record* I note with considerable interest an article on p. 280 relative to the erection of the Empire State Building in New York City. In the interest of correctness I desire to call your attention to an error in this article in regard to the amount of steel used in the Merchandise Mart in Chicago. In the article it is stated that the Merchandise Mart required only 38,000 tons of steel [which was the figure for the first contract let.—EDITOR.], whereas the actual amount used and inspected by us was somewhat in excess of 51,400 tons.

Chicago, Ill.
Sept. 10, 1930.

ROBT. N. MACALISTER,
Robert W. Hunt Co.

# News of the Week

## New Jersey Forbids Use of Lakes by Aircraft

Inland lakes in New Jersey cannot be used by seaplanes for landing purposes, according to a ruling promulgated Sept. 16 by the New Jersey state board of commerce and navigation. The ruling was adopted as a measure of safety, because of the fact that the practice of planes, in landing without permission, has created a situation in which small pleasure crafts are being endangered. The action of the board was prompted by an application for permission to close off a portion of Lake Hopatcong as a taking off and landing place for a proposed line of passenger planes to be flown in regular service to New York City. This application was denied, and the ruling forbidding all landings was extended not only to Lake Hopatcong but to other lakes under the board's jurisdiction.

## Fight Renewed to Break Moffat Tunnel Lease

Renewed attempts to break the Moffat tunnel lease were begun in Denver, Colo., on Sept. 11 when the United States circuit court of appeals granted a petition to reopen the case. The Denver Chamber of Commerce, municipalities and tax-paying bodies in Denver and on the Western Slope are expected to present new arguments to the court in a fresh effort to declare invalid the existing tunnel contract. Under the ruling of the court all parties have an opportunity to file new briefs before Oct. 20. Closing arguments will be heard by the court on Nov. 24.

The present case is an appeal from the U. S. district court, which upheld the validity of the lease.

## Burrard Inlet Bridge at Vancouver, B. C., Again Damaged

Last week the twentieth accident to the Burrard Inlet bridge over the Second Narrows at Vancouver, B. C., happened when the log carrier "Pacific Gatherer" swept away the 300-ft. span of the viaduct. The damage is estimated at $250,000, and it is expected that the bridge will be out of commission for about three months. Directors of the Burrard Inlet & Bridge Co., which owns the bridge, met within a few hours after the accident to prepare plans for repairs. A previous accident to the bridge occurred on April 24, 1930, and was noted in the May 8 issue of *Engineering News-Record*, p. 785. A summary of the eighteen accidents that occurred between 1925 and 1928 was given Sept. 27, 1928, p. 468.

## Welding Advocated For Tall Buildings By Gilbert D. Fish

IN AN address before the New York section of the American Welding Society on Sept. 16, Gilbert D. Fish, consulting engineer for the Westinghouse Electric & Mfg. Co., urged the use of welding in tall buildings, pointing out its reliability and numerous advantages. To focus attention upon the fact that structural welding is not limited in its application to medium-height buildings and to minor connections, Mr. Fish presented the design of a structural steel tower 5,280 ft. high, in which all of the joints were welded, with an estimated saving of 10 per cent in tonnage over comparable riveted construction. Mr. Fish prefaced his remarks by the statement: "There is evidently an immediate need for stating in the plainest possible terms the reasons why welding possesses outstanding advantages for windbracing, and why welded construction can definitely be pronounced suitable for buildings of extreme height."

### Advantages of Welded Joints

Some of the advantages of welded joints were summarized by Mr. Fish as follows: The welded beam-to-column connection can be made to develop any required bending resistance up to the limit of strength of the gross section of the main members. The connection is simple, compact and reasonable in cost. In no case does it require projecting the gusset plates or kneebraces

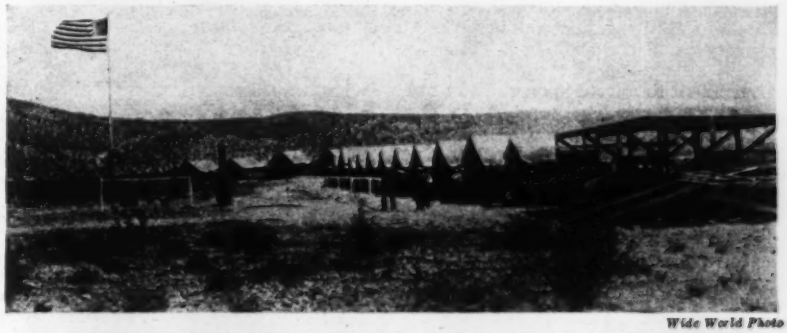
*(Continued on page 508)*

## Steelwork Completed on New York's Empire State Building

On Sept. 19 workers on the roof beams over the 85th floor of the Empire State Building, 1,048 ft. above Fifth Ave. and 34th St., New York City, raised an American flag to mark the completion of steelwork on the building and the attainment of a new record in building heights. Erection of the steelwork began on March 17. The outer walls have been carried to the 75th floor. More than 46,000 tons of steel has been used in the building, according to Post & McCord, steel contractors. The building covers a site of 83,860 sq.ft. on the plot formerly occupied by the Waldorf-Astoria Hotel. For the building Starrett Brothers & Eken, Inc., is the general contractor, Shreve, Lamb & Harmon are the architects and H. G. Balcom designed the steelwork.

## Washington City's Power Rights Involved in Suit

The last of a long series of lawsuits involving rights of the city of Centralia, Wash., in its million-dollar hydroelectric power project on the Nisqually River will be held in federal court at Tacoma before a jury. The city is condemning the alleged water rights of the Puget Sound Power & Light Co. which the latter company contends it owns on the Nisqually River. The company's claim is based on ownership of land and not on the right granted it by the state. A decision in favor of the power company, it is stated, might seriously affect the state's authority to grant water-power rights on its streams.



*Wide World Photo*

**TEMPORARY GOVERNMENT CAMP AT HOOVER DAM**

**When on Sept. 17 Secretary of the Interior Wilbur formally started work on the $165,000,000 Boulder dam, he announced that the project would be known as the Hoover dam in honor of the President. Officials from six Colorado River basin states, Nevada, California, Colorado, Utah, New Mexico and Wyoming, attended the ceremony. Arizona officially was conspicuously absent. The site of the town which will house the dam workers and their families will be on the hill in the background. It is reported that the town will be named Wilbur, after the Secretary of the Interior.**

## Welding Urged for Tall Buildings

(*Continued from page* 507)

unless for the purpose of reducing the stresses or the deformations in the main members. However, as stiffness rather than strength is the criterion for wind-bracing design, welding has the advantage of greater stiffness than riveting. Welded connections permit marked economies by designing beams as fixed or continuous rather than as simple or unrestrained, as is necessary with riveted construction.

### Mile-High Tower

The design of the mile-high tower was introduced by Mr. Fish in order to carry the discussion into the field of tall structures whose dimensions have not been explored by actual construction and to point out the reasons why arc welding would be preferable to riveting for such a structure. In certain respects the design was approximate—such as employing mathematical integration to determine wind stresses, accumulated weights and cross-sectional areas as functions of the distance from the apex. In Mr. Fish's opinion, however, the values which he found are correct within 10 per cent. The tower has a base 528 ft. square, or one-tenth of its height. The wind pressure was assumed at 20 lb. per square foot of exposed vertical surface, the foundation being tested for stability and soil pressure under 50 per cent extra wind pressure. The main posts forming the four legs of the pyramid are each composed of a cluster of four columns arranged in a square, 20 ft. on a side, braced by trusses in the four outer planes and by transverse bents. The study showed a requirement of 19,000 tons of structural steel for a tower with welded connections. The possibility of using high-strength alloy steel was not considered.

## Ralph Budd Returns From Russian Railway Inspection Trip

Ralph Budd, president of the Great Northern Railway, has returned to St. Paul from a trip which he made to Russia at the request of the Russian government to advise upon railway matters there. His party spent 75 days inspecting Russian railways.

As Mr. Budd's report has not yet reached the Russian government, no details of its recommendations have been given out. However, Mr. Budd states that while Russian railways heretofore have followed European practice and standards, which are based upon the use of small cars and locomotives, and while there still is a strong sentiment favorable to German railway practice, there seems to be an even stronger inclination to adopt railway methods and standards used in this country and Canada.

Mr. Budd and his party made an automobile trip over the Caucasus range where a 120-mile railway is projected. If built, the railway will have a tunnel approaching the length of the new Cascade tunnel in this country.

## Consulting Welding Company Formed by Well-Known Engineers

A group of engineers long active in the development and application of welding has recently formed the Welding Engineering & Research Corp., with offices in New York City. The activities of the company will be devoted to industrial and scientific welding research and engineering, and the services of its members will be available for consulting on all problems relating to welding. Preparations are being made to equip a modern research laboratory. The company will assist in certifying the qualifications of welders for special work, will inspect finished welded construction and will check drawings and designs for welded structures.

C. A. Adams, professor of engineering at Harvard University, is president of the new company; J. H. Deppeler, chief engineer of the Metal & Thermit Corp., is vice-president; S. W. Owens, formerly director of welding for the Newport News Shipbuilding Co., is director of welding and secretary; and C. A. McCune, formerly director of research of the American Chain Co., is director of research and treasurer. L. S. Moisseiff and A. V. De Forest are special consultants.

*Wide World Photo*

**NEW YORK'S NEW ELEVATED HIGHWAY**

**The first section of the new elevated speedway in New York City, a wide overhead road for vehicular traffic north and south on the Hudson River waterfront, as it now appears from an airplane. The roadway will contain two separate lanes, each 30 ft. wide. This illustration shows the speedway as now nearly completed from Canal St. to 23d St. This section is being constructed by James B. Stewart & Co. Eventually the speedway will be extended to 72d St.**

## St. Lawrence Power Commission Names Its Engineers

The St. Lawrence Power Development Commission, through its chairman, Robert Murray Haig, has announced the membership of its engineering board which is to report to the commission upon the technical feasibility and financial cost of the proposed water-power development. The members of the board are:

Lieut.-Gen. Edgar Jadwin, Washington, D. C., formerly Chief of Engineers United States Army, chairman; William H. Woodard, New York City, general consulting engineer; O. G. Thurlow, Birmingham, Ala., vice-president in charge of the southern division, Allied Engineers; Frederick Stuart Green, Albany, superintendent, department of public works of New York.

## California Engineer Orders Lake Hodges Dam Strengthened

The city council of San Diego, Calif., has been informed by Edward Hyatt, state engineer, that the city must stiffen and strengthen the buttresses of its Lake Hodges dam before the dam will be given the approval of the state engineer's office. The state engineer has asked that the work of strengthening the dam be started at once. Enlargement of the spillway capacity, which was also requested by the state engineer, has been completed.

A year ago the dam was pronounced "structurally safe except in case of major earthquake shocks or overtopping" by a board of consulting engineers appointed by the state engineer, consisting of Fred C. Herrmann, B. A. Etcheverry and A. Kempkey. At that time the board specifically recommended the improvement of the spillway to discharge safely the maximum predicted floodflows to prevent overtopping the remainder of this structure. The board had been appointed at the request of the San Diego board of supervisors because residents below the dam became alarmed at reports that it was endangered by cracks in the buttresses, extending in some cases from the arch to near the foundation (*Engineering News-Record*, July 25, 1929, p. 132).

A description of the dam, now eleven years old, was given in *Engineering News-Record* April 10, 1919, p. 720.

## Canada Favorably Disposed to St. Lawrence River Bridge

New York State's St. Lawrence River Bridge Commission, which waited on the Canadian government recently, was promised Canadian co-operation in studying the feasibility of bridging the river. Premier Bennett informed the commission that he would not commit himself or the government further until the project's feasibility and the cost had been studied by the engineers of the department of public works.

## Two Indiana Cities Ordered to Build Sewage-Disposal Plants

A sewage-disposal plant must be constructed during the coming year at Newcastle, Ind., according to an order issued by the Indiana board of health to the city council. The council is hostile to the state board's demand, as the site would cost $500,000 and the city's bonding power under the law would have to be exceeded. A committee has been appointed to confer with the state board. The disposal plant is deemed necessary to remedy pollution of Blue River.

The city of Washington, Ind., has also been instructed by the Indiana board of health to act immediately toward the construction of a sewage-disposal plant and a sanitary sewer system.

## New York's Tunnel Plans

On Sept. 19 the War Department approved plans for the New York City board of transportation and the department of plant and structures for the construction of twin vehicular tunnels under the Narrows of New York Bay. The tunnels will extend from a point near Lyman Ave., Staten Island, to a point near 97th St., Brooklyn. Because of the magnitude of the work the usual three-year period allowed for the completion of such a project was extended to Jan. 1, 1937. The approval was contingent upon the furnishing by the city of New York of an agreement to compensate the federal government for the expense of any operations necessary to protect navigation in connection with the work.

The New York City board of transportation has asked the War Department for permission to construct an $85,000,000 vehicular tunnel under 38th St. and the East River. The terminal is part of the proposed regional plan development for New York and if this and the proposed Weehawken tunnel are constructed, it will be possible for vehicular traffic to pass from Long Island City to New Jersey across Manhattan Island, for the most part and perhaps wholly underneath the surface.

## Canadian Good Roads Association Meets at Quebec

The seventeenth annual convention of the Canadian Good Roads Association was held in Quebec Sept. 16 to 18 with an attendance of about 500, including many from Great Britain and the United States. Addresses were delivered by provincial ministers and highway officials dealing with conditions in the different provinces.

J. E. Perrault, minister of highways and mines for Quebec, dealt with the progress made by that province in highway construction during the last twenty years, involving the building of more than 13,000 miles of permanent highway. J. T. Sharpensteen, assistant maintenance engineer of the Michigan state highway department, spoke on gravel roads, dust layers and maintenance. Other addresses were made by George S. Henry, minister of public work for Ontario; W. Ress Jeffreys, of London, England; H. A. McKeown, chairman of the board of railway engineers, and Alexander Fraser, chief engineer for the Province of Quebec.

The following officers were elected: president, J. E. Perrault, minister of highways and mines for Quebec; vice-presidents, N. S. Loughead, minister of public work for British Columbia; A. C. Stewart, minister of highways, Saskatchewan; W. R. Hibbs, minister of public work, Newfoundland; secretary-treasurer, George McNamee, of Montreal.

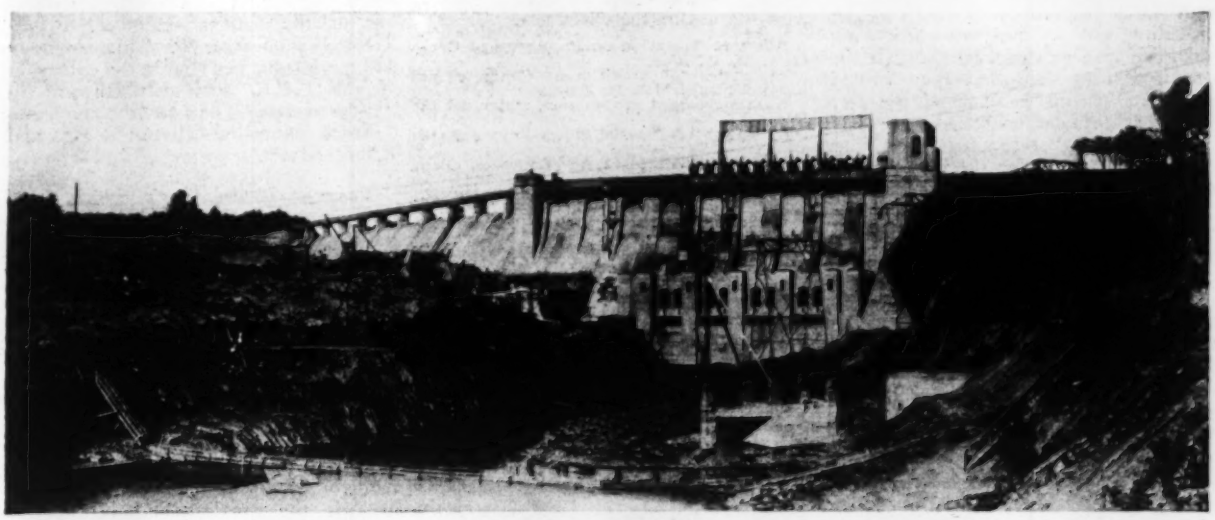
## Program of A.G.C. Fall Meeting at Rye, N. Y., Oct. 6-8

The following program has been announced for the fall meeting of the executive board, advisory board, presidents' council and secretaries' council of the Associated General Contractors of America to be held at the Westchester Country Club, Rye, N. Y., Oct. 6-8:

Monday, Oct. 6—10:30 a.m., business session; 12:30 p.m., lunch at Westchester Country Club; 2 p.m., business session; 6 p.m., secretaries' supper meeting; 8 p.m., joint meeting, Bronx and Westchester chapters of New York State Society of Engineers and the highway division of A.G.C.; 8 p.m., meeting of state construction contractors.

Tuesday, Oct. 7—10 a.m., business session; 12:30 p.m., lunch at Country Club; 1:30 p.m., golf tournament; 6:30 p.m., banquet and dance.

Wednesday, Oct. 8—10 a.m., business session; 12:30 p.m., lunch at Westchester Country Club; 2 p.m., trip to Otis Elevator Co., Yonkers, N. Y.



**FIFTEEN MILE FALLS DEVELOPMENT COMPLETED ON TIME**

**Officials of the New England Power Association announce that the new 200,000-hp. development at Fifteen Mile Falls, on the upper Connecticut River, will be completed on Oct. 1, according to schedule, and dedication ceremonies will probably be held Sept. 30. The plant is located near the towns of Barnet, Vt., and Monroe, N. H., and consists of an earth dike on the New Hampshire side of the river, a mass concrete dam extending across the river to the Vermont shore, and retaining walls running upstream along the New Hampshire side of the river channel. An overflow spillway section, on the Vermont side, is 850 ft. long and varies in height from 20 to 85 ft. For the construction of this hydro-electric plant, 60,000 cu.yd. of excavation was necessary. The retaining wall, extending about 500 ft. upstream, is 170 ft. high at the mid-section and required 90,000 cu.yd. of concrete. The intake section through which the water passes to the wheels consists of four penstocks 19 ft. in diameter; these penstocks are 150 ft. long, and each weighs about 190 tons. The power house is a steel-frame brick structure, 236x99 ft., provided with two 115-ton electric cranes. The generators are vertical direct-connected.**

## Diablo Construction Camp to Be a Tourists' Rest

Purchase of the entire Diablo construction camp of the Winston Brothers Co., builder of the new Diablo dam, has been recommended to the Seattle, Wash., city council by its utilities committee. Purchase price is $12,500. The city plans to use the camp as a commercial tourist camp and for workmen at the Diablo power site.

## New Montreal Railway Terminal to Follow Original Layout

The new terminals of the government-owned Canadian National Railways in Montreal are to follow the general layout shown in the plans approved by parliament in 1929 rather than that proposed in the report of William C. Lancaster, chief engineer of the Transit Commission at New York, outlined briefly in *Engineering News-Record*, Sept. 4, 1930, p. 380.

Following the publication and discussion of the Lancaster plan, opposition to its adoption was found to be so general that the city officials decided to give their approval to the general features of the railroad company's plan, the one which already had received the approval of parliament, reserving only the right to pass upon certain details, so that the work, which was stopped at the city's request in June, could be resumed.

Opposition to the Lancaster proposals came from both the railway company and civic organizations throughout the city. Railway officials objected to the plan as being inferior to their plan both in conception and as an operating entity; and as introducing unknown elements of cost through the substitution of depressed for elevated tracks in certain sections of the city where subsurface conditions are bad and through its recommendation that tunnels be built under the city to connect isolated stations. Civic bodies also objected to some of the major changes in the railway company's plan recommended by Mr. Lancaster.

Their chief objection, however, centered upon the idea of attempting to open up the engineering features of the terminal scheme to reconsideration months after the Canadian parliament, upon the conclusion of an independent engineering investigation of them by Sir Frederick Palmer, had given its approval to the general features of the project. Also, reconsideration of the project meant further delay on a long-delayed project, they claimed, an especially undesirable development just at this time when there is much unemployment in the city. It was charged that the movement for a new plan was a political one, predicated not upon any genuine dissatisfaction with the project in general but upon the desire of one of the political leaders to have depressed tracks substituted for elevated tracks in his district. Rumor went so far as to state that some of those asking for the change were financially interested in property required for track depression.

The city council's attempt to have the entire project reconsidered finally collapsed when the premier of Canada, to whom the council had addressed a request for a reconsideration by parliament, declined to act, pointing out to the city that there was no need to have the whole project reconsidered in order to open up the question of elevated or depressed tracks, as the scheme as approved by parliament left that detail open to negotiation between the city and the railway company.

## A.C.I. Meeting to Be Devoted to Lightweight Concrete

The 27th convention of the American Concrete Institute will be held in Milwaukee, Wis., Feb. 24-26, 1931, at the Schroeder Hotel. It has also been announced that the 28th annual convention, during the week of Feb. 22, 1932, will be held in Washington, D. C. These announcements, together with those concerning numerous new committee studies, have just been made.

The program committee for the 1931 convention has under development one session devoted entirely to lightweight concrete in which it is planned to give full consideration to the characteristics of cinders and burned clay for aggregate and to the design considerations necessary in using such aggregate in concrete. Another session will be devoted to papers and reports on concrete durability.

Among the important committee announcements are the following, together with the committee chairmen:

Effect of Vibration on Properties of Concrete, W. A. Slater.
Properties of Job-Cured Concrete at Early Ages, Harlan H. Edwards.
Heat Developed in Concrete, Raymond E. Davis.
Summary of Plastic Flow, Raymond E. Davis.
Use of Admixtures in Concrete, Ben Moreell.
Cinders as Aggregates, Einar Christensen.
Shale Aggregates, George E. McIntyre.
Basis of Design for Hurricane Exposures, Albert Smith.
Foundation Settlement, Hardy Cross.
Lightweight Concrete in Buildings, Frank A. Randall.
Use of Bulk Cement, Herbert Coffman.

An allied matter, also announced, is the reorganization of the joint committee on specifications for concrete and reinforced concrete, of which the American Concrete Institute is a member. Other members are the American Railway Engineering Association, American Society for Testing Materials, American Society of Civil Engineers and the Portland Cement Association. S. C. Hollister is chairman of the A.C.I. representation, C. P. Richardson of the A.R.E.A. representation, C. M. Chapman of the A.S.T.M. representation, W. A. Slater of the A.S.C.E. representation, and F. R. McMillan of the Portland Cement Association representation. The new joint committee chairman is W. A. Slater; S. C. Hollister is vice-chairman and F. R. McMillan secretary.

## Oakland, Calif., to Vote on City Manager Plan

The city council of Oakland, Calif., has adopted two resolutions calling for special elections to be held simultaneously with the general election on Nov. 4, 1930. The first election will be held for the purpose of voting on the proposed amendment to the city charter providing for the city manager plan of government. The second election will be called "for the purpose of choosing a board of freeholders to prepare and frame a new charter for the city of Oakland, so that the same may be submitted to the electors."

# *Brief News*

COLUMBIA UNIVERSITY announces the appointment of Joseph W. Barker as dean of the school of engineering, succeeding George P. Pegram. Professor Barker was formerly head of the electrical engineering department at Lehigh University.

EIGHTY-SEVEN LOCAL ENGINEERING COMMITTEES, representing a total of about 450 engineers, have been organized to work in co-operation with the committee on airport drainage and surfacing which represents the American Engineering Council, the American Road Builders Association and the aeronautics branch of the Department of Commerce.

THE CANADIAN PACIFIC RAILWAY will enter Prince Albert, Saskatchewan, for the first time with the formal opening of the Lanigan-Humboldt-Prince Albert line on Sept. 30. This ceremony will mark a further step in the extension of the C.P.R. service northward in Saskatchewan. The new line completes a direct connection between Regina and Prince Albert.

TRAFFIC REGULATIONS which have been carried over and added to in Boston for many years, Mayor Curley finds, have become so confusing that he has directed the traffic commission to devote primary attention to a revision of the traffic code. Leaders of business and professional interests in the city have been invited to make suggestions at a conference soon to be called.

AN AVERAGE BUILDING HEIGHT of not more than ten stories on a maximum of 40 per cent of the gross land area is the greatest building density which any section of the borough of Manhattan, New York City, can tolerate without exceeding the limitations of the existing street system and the possibilities of transit development, is the conclusion reached by the Regional Plan of New York in a report made public Sept. 22. An ideal apportionment of the ten-story average, the report suggests, would be six-story buildings on three-quarters of the area available, with skyscrapers on the remaining quarter.

## Detroit Awards Contract for New Type of Welded Pipe

Electric welded pipe will be used in Detroit, Mich., in laying 13,700 ft. of water main in 54- and 66-in. sizes under a contract recently awarded by the Detroit department of water supply to A. Phelps & Son, of that city. Plates of pure iron, ½ in. thick and 122 in. wide, will be rolled so that each one will form a complete ring. Plate lengths will be 173¼ in. or 212 in., according to the size of pipe. The rings will be butt-welded at the ends and then lap-welded together to form 40-ft. sections in the case of the 54-in. size and 30-ft. lengths for the 66-in. The use of 40-ft. lengths will result in a large reduction in the number of field joints, with a corresponding decrease in field work. All sections will be carefully tested for tightness, the surface thoroughly cleaned and the pipe dipped in a protective coating before shipment. Because of the lap-welded circular joints, the pipe will be unusually stiff, making it possible to place it under deep fills without angle reinforcing rings. The contract, which calls for a total of 2,100 tons of metal, involves furnishing and laying 7,100 ft. of 54-in. and 5,600 ft. of 66-in. pipe, which will be fabricated by the United Welding Co., Middletown, Ohio, of material supplied by the American Rolling Mill Co., also of Middletown.

### *The Business Outlook*

**There is no longer any doubt that the resistance level of this depression was reached some time in August. The only question now is as to the speed, vigor and permanence of the recovery during the remainder of this year. There are but six more weeks to go to the peak of the fall seasonal movement. This hill has to be taken on high to short-cut a stretch of rough and slow going this winter. The get-away so far in September has been somewhat slow, but the first two weeks have shown slightly more than seasonal improvement. Basic industrial activity is increasing slowly, building projects are somewhat more active, primary distribution and general trade are showing fair seasonable expansion, commodity prices are definitely settling into stability, preparing for an upturn as forward buying becomes more active.**

***—The Business Week, Sept. 24.***

# WASHINGTON NOTES

By Paul Wooton
*Washington Correspondent*

## Jadwin Plan Likely to Be Modified As a Result of Secretary Hurley's Inspection Trip on the Mississippi

ON HIS 2,000-mile inspection trip down the Mississippi from St. Paul to New Orleans, Secretary of War Hurley obtained first-hand information of the task confronting the War Department in keeping the river open for navigation and in controlling floods. Mr. Hurley did not make the trip for the purpose of rendering an immediate verdict on whether or not the Jadwin plan should be changed or on policies in connection with the river improvement work. He merely desired to observe conditions on the river and obtain a general conception of how the work is being done.

Immediately upon his return to Washington Mr. Hurley talked with the President at some length about the river work. Until the army engineers have submitted their report on reservoirs and other proposed modifications of the existing project he will not reveal his recommendations. To those who accompanied him on his trip, however, it is evident that he is not entirely satisfied with some of the features of the Jadwin plan.

The most controversial part of the Jadwin plan is the diversion of 900,000 sec.-ft. down the Boeuf basin in Arkansas and upper Louisiana. Harry Jacobs, chief engineer for Louisiana, has submitted a plan providing for the elimination of the Boeuf floodway and substituting reservoirs in the lower Arkansas and White rivers to give the necessary relief in case of a superflood. After flying over the territory that will lie in the path of the diversion, Secretary Hurley stated that he was impressed with the apparent value of the land. He saw that a much larger proportion of the territory is under cultivation than he had supposed. If it appears that the property is more valuable than was presumed in the original plan, the secretary thinks that more consideration can be given to alternate proposals to take care of the water in some other way than sending it down the Boeuf.

### Hurley Impressed by Work of Local Levee Districts

Another point that impressed the secretary during his air trips over the floodway section was the great amount of work the local levee districts must do to take care of drainage disrupted by the construction of levees. From his airplane he saw long drainage ditches that have been constructed at the cost of millions of dollars for the purpose of draining the land away from the levees.

Mr. Hurley was informed by Louisiana engineers that all of the work that was necessary to construct the drainage ditches would be scrapped by the diversion. He also obtained an understanding of the expense to which residents outside of the spillway section will be put in providing for drainage that will be dammed up by the construction of the guide levees. While he has a profound respect for the technical opinion of the engineers, Secretary Hurley believes that there is also a practical side to the problem. He intends to decide this side of the question himself. It is thought probable that he will recommend a modification of the Jadwin plan that will eliminate the Boeuf floodway.

### Gen. Brown Believes That Reservoirs Are Practicable

Gen. Lytle Brown, Chief of Engineers, who made the trip with the secretary, has indicated that he believes reservoirs in the White and Arkansas rivers would be practicable. Although the army engineers, in the report they are preparing, will submit data about other reservoir sites, he does not believe other locations are worthy of immediate consideration. After seeing every phase of the work, Secretary Hurley expressed the opinion that a decision should soon be reached as to whether or not the existing project will be changed.

### Brigadier-Generalship Urged for Panama Canal Governor

A brigadier-generalship for the governor of the Panama Canal will be asked at the forthcoming session of Congress. While the responsibilities in connection with the post are important, the principal argument for the measure is that it would impress visitors with the importance which is attached to the canal. As the point where a vast amount of shipping converges and where the distinguished of many lands constantly must be welcomed and accorded special courtesies, it should be headed by a representative of this country of higher rank than colonel. At present the governor of the canal is Col. Harry Burgess, an officer of the Corps of Engineers.

### To Study Coastal Erosion

The rivers and harbors act of 1930 authorized the Chief of Engineers to cause investigations and studies to be made to determine effective means of combating coastal erosion. It was specified that a beach erosion board should be appointed to be made up of four engineer officers of the army and three state engineers. Recently the War Department designated the army engineers who are to serve on the board. They are: Col. W. J. Borden, Col. E. I. Brown, Lieut.-Col. Elliot J. Dent and Major Gordon R. Young. The state engineers appointed are: Richard King Hale, associate commissioner of the department of public works in Boston; Victor J. Gelineau, chief engineer of the New Jersey state board of commerce and navigation; and Thorndyke Saville, chief engineer of the department of conservation and development of North Carolina.

Under the terms of the enabling legislation, the board is authorized to make studies under the direction of the Secretary of War and the Chief of Engineers of the erosion of shores along the seacoasts and in the Great Lakes territory and the states must cooperate in appropriating money toward the work.

## Personal Notes

W. H. MIESSE has been appointed division engineer of the Cairo-Terre Haute division of the Cleveland, Cincinnati, Chicago & St. Louis Ry., with headquarters in Evansville, Ind.

WAVELAND S. FITZSIMONS, of Washington, D. C., has been assigned as resident engineer in charge of the U. S. Engineer office at Oswego, N. Y., succeeding John C. Churchill, deceased.

FREDERICK O. TONNEY, director of the research laboratory of the Chicago health department, has been transferred to the laboratory of the Municipal Contagious Hospital of that city, where he will organize a new research department. He will be succeeded in the health department by J. L. WHITE.

G. Ross HENNINGER, for the past six years engineering editor of *Electrical West*, with headquarters in San Francisco, has resigned to become associate editor of the *Journal* of the American Institute of Electrical Engineers.

JAMES D. MARSHALL and P. W. CLARK, of Kansas City, Mo., have united to form the firm of Marshall & Clark, specializing in structural design work. For the past five years Mr. Clark has been associated with Harrington, Howard & Ash, and more recently with Ash, Howard, Needles & Tammen, engaged in the design of bridges. Mr. Marshall also was formerly connected with these concerns, but went into business for himself in Kansas City some years ago.

BURTON LOWTHER, consulting engineer, Denver, Colo., formerly chief engineer, Denver municipal water-works, has been appointed consultant to the Bureau of Reclamation to recommend sources of water supply and their purification and the general arrangement of the water-works system for the townsite at Hoover dam. He will also design a sewer system and disposal works. S. R. DeBoer, city plan engineer, has been planning and laying out the town.

S. C. HOLLISTER has been appointed to head the structural engineering department of the school of civil engineering at Purdue University, succeeding Professor Eriksen, who was recently appointed to the chair of engineering mechanics at the University of Michigan. Professor Hollister has had nearly twenty years' experience in private practice in bridges and buildings, power development, sewage disposal and research in materials of construction. He has recently been engaged in problems arising from the welding of structural steel in buildings and bridges.

FRANCIS X. SCHUMACHER has been appointed chief of the section of forest measurements in the Forest Service, and will endeavor to measure the productive capacity of the various types of forests of the United States in terms of lumber and other products. Mr. Schumacher, who has been teaching forestry in the University of California, will assume his new duties on Oct. 1. At the California university he devised new tests and methods of measurement and crop determination. Mr. Schumacher will succeed V. A. CLEMENTS, who will take up duties at the California Forest Experiment Station.

## Society Calendar

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, New York City; Pinehurst, N. C., Oct. 27-28.

AMERICAN IRON & STEEL INSTITUTE, New York City; semi-annual meeting, New York City, Oct. 24.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York; fall meeting, St. Louis, Mo., Oct. 1-3.

AMERICAN WELDING SOCIETY, New York; fall meeting, Chicago, Sept. 22-27.

ASPHALT PAVING CONFERENCE, New York City; ninth annual conference, Memphis, Tenn., Dec. 1-5.

INTERNATIONAL ROAD CONGRESS; Washington, D. C., Oct. 6-11.

NATIONAL SAFETY CONGRESS, Chicago; annual meeting, Pittsburgh, Pa., Sept. 29-Oct. 3.

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AMERICAN PUBLIC HEALTH ASSOCIATION will hold its annual meeting at Fort Worth, Tex., Oct. 27-30. Of interest to sanitary engineers are the sessions of the public health engineers, laboratory and health officers sections. The committee on standard methods of water analysis will report. Other topics are water-borne typhoid, taste elimination, cross-connections, irrigation and flood sanitation, malarial control and sewage treatment. A nine-day post-convention trip to Mexico City is planned. A conference of state sanitary engineers will precede the American Health Association meeting in Fort Worth beginning Oct. 25.

COUNTY HIGHWAY OFFICIALS DIVISION, American Road Builders Association, at a recent conference of its executive committee in St. Louis, Mo., discussed the subjects of "Financing" and "Low-Cost Roads and Bridges." It was stressed by speakers that the urgent necessity of early attention to a vast highway mileage emphasized the importance of low-cost roads.

MIDDLE EASTERN DISTRICT, American Institute of Electrical Engineers, will hold its sixth meeting in Philadelphia Oct. 13 to 15. There will be presented technical papers of interest regarding engineering projects, such as the Pennsylvania Railroad electrification, the Reading Co.'s railroad electrification, substations of the Broad St. subway and using railroad rights-of-way for power transmission purposes.

SOUTHWEST WATER WORKS ASSOCIATION met in Amarillo, Tex., Sept. 15 to 18, with an attendance of about 200. The following officers were elected: president, Max M. Fife, Blackwell, Okla.; vice-president, Ed A. Fowler, New Orleans, La.; secretary-treasurer, L. A. Quigley, Fort Worth, Tex.; governors—for Texas, L. A. Grimes, Abilene; for Arkansas, S. R. Browgh, Middle Rock; for Louisiana, Thomas L. Amiss, Shreveport; for Oklahoma, Park Davis, Detroit; for Kansas, Charles F. Link, Leavenworth; for Missouri, Leonard Day, St. Louis. New Orleans was selected as the next meeting place.

TACOMA SECTION, American Society of Civil Engineers, at its September meeting in Olympia, Wash., was addressed by George F. Yantis, chairman of the City Plan Commission of Olympia. The capital city plan provides for a comprehensive harbor development, the dredging and parking of Budds Inlet in the southern part of the city and the relocation of the Pacific and Olympic highways through Olympia. President Stannard presented the Tacoma section with a gavel made from a portion of a log encountered in the construction of the tunnel at the city of Tacoma's hydro-electric plant at Cushman. A log jam was found in glacial drift 1,000 ft. in the tunnel and at a depth of 350 ft. The wood was perfectly preserved and is estimated by geologists to be at least 25,000 years old.

## Obituary

FRANK RICHARDS FORD, a founder and member of the consulting engineering firm of Ford, Bacon & Davis, of New York City, died on Sept. 17 in New York City following an operation. He was 58 years old. Mr. Ford was born in Philadelphia and was graduated in 1890 in engineering from the University of Pennsylvania. He spent several years in public utility and industrial engineering and in 1894 founded the consulting engineering firm of which he was a member at the time of his death. He served as a member of the New York and New Jersey Port and Harbor Development Commission from 1917 to 1921, and from 1921 to 1923 as a member of the Port of New York Authority, of which he was an organizer.

JOHN LEONARD ESSON, of New York, vice-president of Ford, Bacon & Davis, Inc., engineers, died suddenly on Sept. 21, at the age of 52. His death closely followed that of Frank Richards Ford, founder of the same firm, who died on Sept. 17. A native of Scotland, Mr. Esson was brought to America as a boy and was educated at the Chicago Manual Training School. For the past 23 years he had been engaged in engineering.

IRA C. WEBB, one of the first contractors after the Civil War period in Indianapolis, died recently in that city. Mr. Webb was born in Buffalo, but settled in Indianapolis before the Civil War. After the war he became a general contractor and continued in that business all his active business life. He was 97 years old.

HENRY PHIPPS, pioneer in the iron and steel business, died at his home in Great Neck, L. I., on Sept. 22. Had he lived until Sept. 27 he would have been 91 years old. In the early 60's Mr. Phipps became a partner in a small iron mill operated under the firm name of Kloman & Phipps. Soon after he formed an alliance with Andrew Carnegie and was associated with him during the growth of the industry.

GEORGE FREDERICK PORTER, for years chief engineer of the Canadian Bridge Co. at Walkerville, Ont., died on Sept. 20 in Detroit, Mich. Mr. Porter, who was born in Detroit 67 years ago, helped to organize in 1900 the Canadian Bridge Co., which became one of the chief bridge-building firms in Canada. In 1909 he joined the staff of the board of engineers appointed by the dominion government to design and supervise the construction of a bridge across the St. Lawrence River near Quebec to replace the one that collapsed during construction in August, 1907. The Canadian Bridge Co. and the Dominion Bridge Co. of Montreal made a joint bid for the erection of the contemplated bridge, and Mr. Porter organized the engineering staff and supervised the work of design, fabrication and erection of the bridge as it now stands.

# Construction Equipment and Materials

## Device Buries Electric Cables Without Excavation

Armored cable can be buried to depths as great as 30 in. with the Ateco cable layer, designed for use with Caterpillar 60 tractors by the American Tractor Equipment Co., Oakland, Calif. The cable layer is equipped with two teeth,

TRACTOR-DRAWN TOOL FOR BURYING CABLE

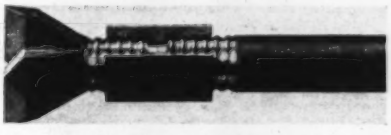
one behind the other, the first cutting to a depth of about 18 in., the second, which is 4 in. wide, to a maximum of 30 in. This depth is variable, and is accurately and easily controlled from the tractor seat by regulating pressure in a hydraulic cylinder. Attached to the rear of the frame is a dirt shield incasing guide rollers for the cable, and a cable wheel mounted on roller bearings. A hook is provided for attaching a trailer to carry reel and cable.

## Precast Beams, Keyed by Job-Made Concrete, Form Light Floor

Simplicity in erection, with the elimination of forms, reinforcing and filler blocks or metal pans at the job, is the advantage claimed for a new type of reinforced lightweight concrete floor slab construction developed and patented by Emil Buehler, 164 East 38th St., New York City. The system can be used with floor spans up to 30 ft. As is shown in the illustration, precast beam sections containing the steel reinforcing are set at the desired spacing, leaving openings to be filled at the job with plain concrete leveled off flush with the top of the beams, which serve as grading strips. Wood nailer strips are inserted for the attachment of wire mesh to either top or bottom. Pipe or conduits running in the longitudinal direction are placed between the webs of the form members, or, transversely, laid through recesses knocked in the webs of the sections. When finished, the field concrete is so interlocked and bonded to the precast beam that the entire assembly acts as a unit to support the load.

## Detachable Bit Speeds Drilling

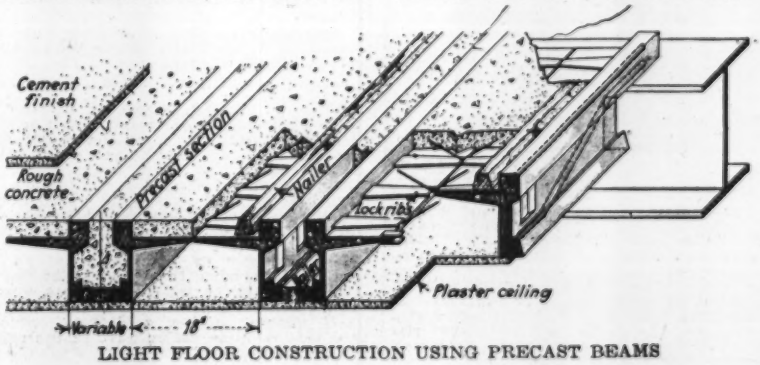
Many advantages are claimed for the three-piece rock drill assembly invented by Fred W. Thurston and marketed by the Detachable Bit Corporation of America, 301 West Side Ave., Jersey City, N. J. The assembly, which replaces the standard one-piece rock drill, consists of a round drill rod made of steel possessing special heat-resistant and high shock-absorption properties, a



COMPONENTS OF DETACHABLE DRILL HEAD

detachable cutting head or bit made of a special heat-treated alloy steel of extreme hardness and resistance to abrasion, and a coupling uniting bit and rod. The latter is so designed that it absorbs the shocks ordinarily taken by the drill rod, eliminating much of the usual rod breakage. The patented reverse round thread on the coupling allows bit and rod to seat and tighten securely while drilling. Bits which are tempered in pyrometer-controlled furnaces are furnished in three styles and in ⅞-, 1- and 1¼-in. sizes. A number of different gages are available. Drill rods, furnished in all standard lengths, are round instead of square, and are provided with a central hole of unusual smoothness.

Among the advantages claimed for this type of drill are a lower capital investment in steel, the elimination of sharpening equipment, less breakage, and lower upkeep on drill hammers. In changing over from the old type of equipment, it is possible to use the detachable bit with the old-style drill steel by cutting it in standard lengths, threading it to fit the coupling and giving it a special heat treatment.



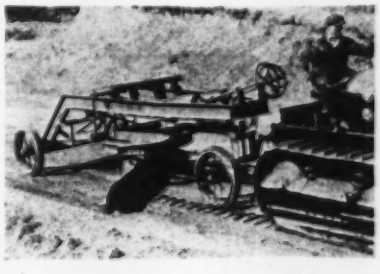

LIGHT FLOOR CONSTRUCTION USING PRECAST BEAMS

## Graduations on Leveling Rod Easily Renewed

On the new Metagrad leveling rod, recently introduced by the Keuffel & Esser Co., New York City, graduations and numbers are placed on a durable, corrosion-resisting metal strip with a permanent white enamel face. This strip is securely attached to the rod, yet can be readily replaced when the markings ultimately show wear. The strip is graduated, numbered and finished before being attached to the rod, which serves merely as a support. Graduations are of the conventional Philadelphia rod pattern. Use of the replacable strip obviates the necessity of scrapping the rod when the marking becomes blurred.

## Graders for Tractor Attachment

Two new one-man graders, adapted for use with the Monarch 35 tractor by the Shaw-Enochs Tractor Co., Stillwater, Minn., are being distributed through the Allis-Chalmers sales organization. One of these graders, the Century, is designed for both maintenance and construction work and can be changed into a two-man unit if desired. An unusual feature of this model is its reversible controls. When used as a



GRADER WITH REVERSIBLE CONTROLS

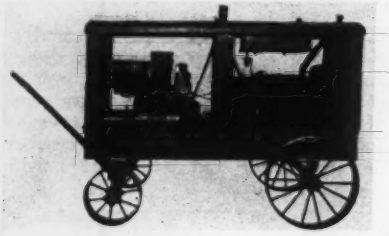
one-man maintainer, the controls are placed in front within easy reach of the tractor seat, but for use as a two-man unit, they can be transferred to the rear of the grader in less than an hour's time and without additional parts.

The other grader, the Shawnee No. 2, is especially adapted to heavy maintenance and scarifying of city streets and roads having heavy traffic. With the Monarch 35, this grader is also recommended to paving contractors as an excellent subgrade maintainer and subgrading grader to work ahead of the paver. This machine is also adapted to cutting form trenches. It develops a blade pressure up to more than 5,000 lb. depending on size of blade and equip-

ment used, and will handle blades up to 16 ft. in length. The blade and frame, an integral unit, is raised through crank axles mounted on Timken roller bearings. The blade is adjusted with large screws housed in seamless steel tubes, one telescoping over the other.

## Gasoline-Driven Welder Rated at 400 Amperes

Designed especially for field use in all kinds of construction work, and particularly adapted for use with large electrodes, a new gasoline-engine-driven welder with a rating of 400 amp. has been placed on the market by the Lincoln Electric Co., Cleveland, Ohio. The machine is of the variable-voltage single-

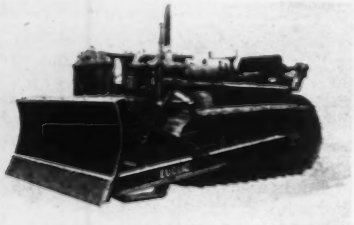


400-AMP. WELDER

operator type with a current range up to 500 amp. As in other Stable-Arc welders, the working mechanism of all controls is contained in a ventilated inclosed steel cabinet with hand regulators and switches mounted on a panel, giving unified control which greatly increases the simplicity of operation. Power is supplied by a six-cylinder engine developing 55 b.hp. at 1,500 r.p.m. An automatic throttle control permits the engine to idle at about half speed when the arc is not in operation.

## Bulldozer Attachment Controlled by Hydraulic Jack

A specially designed hydraulic pump and lifting jack, so constructed that it eliminates the necessity for a two-way



TRACTOR ATTACHMENT FOR BULLDOZING

jack yet permits leveling operations, is used to control the Euclid bulldozer, recently announced for tractor attachment by the Euclid Crane & Hoist Co., Euclid, Ohio. This unit is light in weight, yet unusually strong and is so attached as to leave the drawbar absolutely free for other uses.

**ASH REMOVAL WITHOUT DUST OR NOISE**

**Transfer of ashes by pneumatic means directly from the basement of a building to an airtight container mounted on a motor truck is the function of the Triple-A ash-removal system, developed and patented by the Allen Air Appliance Co., Inc., 452 Lexington Ave., New York City. The apparatus is mounted on two motor trucks which are temporarily joined together by a large hose. The truck on the right, the dump unit, carries the airtight steel ash container, while that on the left, the power unit, contains a 75-hp. Continental motor operating a multi-stage Triple-A vacuum producer, together with two large dust filters. Dividing the apparatus between two trucks makes it unnecessary to transport the power unit to the dump.**

## *Business Notes*

EUCLID CRANE & HOIST CO., Euclid, Ohio, has completed a 10,000-sq.ft. addition to its plant, which will be used in manufacturing the new Euclid bulldozer.

CUMMINGS CAR & COACH CO., Chicago, Ill., has become affiliated with the J. G. Brill Co., of Philadelphia, Pa. W. J. Cummings has been elected a director and vice-president of the Brill company and will be in charge of the Western division, with headquarters in Chicago. A. P. Jenks, vice-president of the Cummings company, will be district manager.

HERCULES POWDER CO., Wilmington, Del., has appointed J. H. Horlick, Jr., assistant director of sales of the explosives department. J. Barab will take over his former duties as manager of the service division, explosives department.

JOHN J. CONE, president of the Robert W. Hunt Co., Chicago, Ill., and a member of that company since its organization in 1888, has retired. C. B. Nolte, vice-president and general manager, has been elected president and general manager, with headquarters at Chicago. J. C. Ogden, a director and Eastern manager of the company, has been elected vice-president, with headquarters at New York City.

MATERIAL SERVICE CORP., Chicago, Ill., announces the appointment of A. J. Joyce as assistant to the president. For the past 24 years Mr. Joyce has been connected with various subsidiaries of the United States Steel Corp., including the Illinois Steel Co. and the Universal Atlas Cement Co.

KEYSTONE PORTLAND CEMENT CO., Philadelphia, Pa., has elected Harold M. Scott president, succeeding the late John Barnes. Mr. Scott was formerly general sales manager for the Atlas Portland Cement Co.

STANDARD VARNISH WORKS, New York City, has acquired the business and good will of the National Varnish Co. F. W. Herz and John E. Sanderson, president and vice-president of the National company, have joined the staff of the Standard Varnish Works.

A. M. BYERS CO., Pittsburgh, Pa., has appointed M. J. Czarniecki, formerly assistant general manager of sales, to the newly created position of manager of tubular sales. H. R. Rowland, division manager, has been transferred to Pittsburgh, Pa. Mr. Rowland was formerly division manager at Philadelphia, where he will be succeeded by E. L. MacWhorter. The company's new $12,000,000 plant for manufacturing wrought iron under the Aston patents will be opened early in October.

SAUERMAN BROS., INC., Chicago, Ill., is now supplying Durolite steel dragline blocks in sizes varying from 6 to 42 in. The blocks, which were described in *Engineering News-Record*, Nov. 17, 1927, p. 819, are supplied with either bronze bushed or roller bearings, and with swivel hook, swivel rope-bearing eye or swivel pin-bearing eye attachments.

NATIONAL LUMBER MANUFACTURERS ASSOCIATION has selected J. E. Mackie, of its engineering and building code staff, to be field engineer in the Pacific Northwest for the National Lumber Trade Extension Bureau.

ROLLER-SMITH CO., New York City, has appointed J. K. Webb district sales agent for the State of Texas.

FRED F. SMITH, assistant director of sales, explosives department, Hercules Powder Co., died Sept. 6, as the result of a heart attack. He was 48 years old. Born in Eldorado, Kan., Mr. Smith spent his early career in Kansas and Missouri. In 1908 he left the employ of the Missouri Pacific Railroad to become traffic manager of the Independent Powder Co. at Joplin, Mo. In a short time he became assistant sales manager of this company, and in March, 1914, when the Independent Powder Co. was acquired by the Hercules Powder Co., he went to Wilmington, Del. He was well known in the explosives industry, having taken an active part in the affairs of the Institute of Makers of Explosives.

## *Costs and Contracts*

### E. N.-R. Index Numbers

| Cost | | | Volume | |
|---|---|---|---|---|
| **Sept. 1, 1930** | **199.58** | **August, 1930** | | **259** |
| Aug. 1, 1930 | 200.95 | July, 1930 | | 226 |
| Sept. 1, 1929 | 207.57 | August, 1929 | | 290 |
| Average, 1929 | 207.02 | Average, 1929 | | 317 |
| Average, 1928 | 206.78 | Average, 1928 | | 287 |
| 1913 ..... | 100.00 | 1913 ..... | | 100 |

### This Week's Contracts

Heavy construction contracts, reported by *Engineering News-Record* in the week of Sept. 25, with some comparisons, total as follows:

(In Thousands of Dollars)

| | Sept. 25, 1930 | Average of Last Four Weeks 1930 | 1929 |
|---|---|---|---|
| Buildings: | | | |
| Industrial ..... | $3,492 | $4,410 | $6,212 |
| Other ..... | 22,996 | 23,094 | 43,834 |
| Streets and roads.. | 11,316 | 10,395 | 12,229 |
| Other eng. constr.. | 9,840 | 16,500 | 19,170 |
| Total ..... | $47,644 | $54,399 | $81,445 |
| Total, all classes, Jan. 1 to Sept. 25: | | | |
| 1930 ..... | | | $2,571,470 |
| 1929 ..... | | | 3,221,505 |

# *Unit Prices From Current Construction Bids*

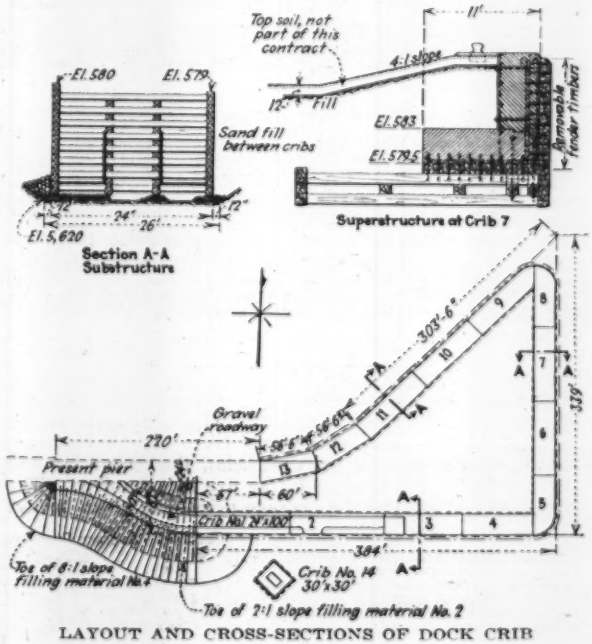
## Extension to State Ferry Dock at Mackinaw City, Mich.

AN EXTENSION to the state ferry dock at Mackinaw City, Mich., is being built under the direction of the state highway department. The extension, shown in the drawing, is triangular, providing space for docking three boats. It consists of thirteen timber cribs 24x68 to 100 ft. by 16 ft. high, with a total crib length of 1,044 ft. Work includes preparation of foundations, building and placing cribs and filling with loose rock, placing interior filling, and building concrete superstructure. In addition, there is a detached protection crib 30x30 ft. in plan by 27 ft. high.

Material to be excavated consists of hard, tough, sandy clay with pockets of sand and overlying thin occasional spots of soft clay, with but few boulders. The cribs will be founded on a 12-in. mat of unscreened gravel or crushed rock of 3 in. maximum size in depth of 17 to 28 ft. Before placing the mat for the protection crib, an area excavated 2 ft. deeper in the center of the crib foundation is filled with boulders having minimum weight of 5 tons and maximum dimension of more than 50 per cent greater than the minimum.

*Cribwork*—The state furnishes f.o.b. city all crib and face wall timbers having sections more than 100 sq.in., all other timbers being furnished by the contractor. The cribs are placed consecutively, beginning at the south corner of the site. Meanwhile the present pier is kept in service until the south face formed by the first three cribs is available. Final sinking of the cribs is by external weights of No. 2 material, consisting of rock up to 18 in. with voids filled with fine material. Filling with No. 2 by bucket and chute is begun as soon as the crib is accurately placed and continues for 14½ ft., above which the fill is No. 3 sand or gravel with sufficient loam or clay to leave a well-drained soil which extends to within 1 ft. of final ground surface. The last foot of fill will be placed by separate contract.

*Backfilling* behind cribs is deferred until docking facilities are provided on the south side. The material is sand or gravel (No. 3) and is carried to within 1 ft. of the finished grade. Simultaneously with placing the first three cribs, the contractor constructs the approach fill which connects the first crib with the present dock. This fill is a triangular prism of No. 2 material covered with a 3-ft. mat of 1- to 5-ton riprap (No. 4 material) between the 2 to 1 and 3 to 1 slopes. The area above the fill and back of the shoulder consists of filling material No. 3. Material No. 1 is for crib foundations; No. 5 is 5-ton-boulder fill for the protection crib; No. 6 is compacted gravel surfacing.




LAYOUT AND CROSS-SECTIONS OF DOCK CRIB

UNIT PRICES OF MACKINAW CITY STATE FERRY DOCK

| | A | B | C |
|---|---|---|---|
| Crib foundation excav.: | | | |
| 3,716 cu.yd. unclassified | $2.50 | $1.50 | $2.50 |
| 150 cu.yd. rock | 10.00 | 20.00 | 14.00 |
| Fill material in place: | | | |
| 1,100 cu.yd. No. 1, found. | 2.50 | 1.25 | 2.50 |
| 500 tons No. 5, fender | 3.00 | 4.00 | 4.00 |
| 10,400 cu.yd. No. 2, crib | 1.60 | 2.25 | 1.50 |
| 6,000 cu.yd. No. 3, crib | 1.00 | 1.25 | 1.50 |
| 28,000 cu.yd. No. 3, inter. | .80 | .50 | 1.50 |
| 1,900 cu.yd. No. 2, approach | 1.60 | 2.25 | 1.50 |
| 1,400 cu.yd. No. 3, approach | .80 | .75 | 1.50 |
| 1,250 tons No. 4, approach | 3.00 | 3.25 | 4.00 |
| 200 cu.yd. No. 6, gravel | 1.50 | 2.00 | 2.00 |
| Furnished by state: | | | |
| 131,282 cu.ft. timber work | .40 | .45 | .35 |
| Furnished by contractor: | | | |
| 19,100 cu.ft. timber work | .88 | .90 | .85 |
| 200,000 lb. hardware, bolts, rods | .05 | .07 | .08 |
| 152,000 lb. reinf. steel | .045 | .05 | .06 |
| 6,000 lb. str. steel | .07 | .10 | .08 |
| 2,685 cu.yd. cl. A concr. | 14.00 | 13.00 | 15.00 |
| 2,280 lb. old rail crib anchors | .05 | .26 | .07 |
| 31 mooring bollards by state | 10.00 | 15.00 | 15.00 |
| Totals | $192,885 | $199,816 | $221,773 |

*Concrete* for the superstructure is class A, 1:2:3 mix, with a cement content of 6.3 to 7 sacks per cubic yard and a 28-day modulus of rupture of 700 lb. The structure is built in alternate sections not exceeding 28 ft. in length.

*Progress*—Work was to have started about June 25, and the first three cribs and the fender crib were to be finished and ready for concrete July 15 and concreted by Aug. 1. The approach fills also were to be complete Aug 1, and temporary dock service established Aug. 25. Because of delay due to accidents and changes made in the plans, consisting of rotating the body of the dock in a clockwise direction through an angle of 22½ deg. to comply with an easement requirement of the Michigan Central Railroad Co., which has riparian rights on the northerly side of the dock, the schedule was revised and provides for work being up to original schedule by Oct. 15. The contract is to be completed, including clean-up, by Dec. 1.

Five bids were received June 12, 1930, and unit prices are given of the lowest three bidders, all of Michigan: A, Lyon Construction Co. (contract award), Grand Rapids, $192,885; B, William J. Meagher, Bay City, $199,816; C, T. L. Durocher Co., DeTour, $221,773. C. A. Melick is bridge engineer of the state highway department.

## Two Wharf Foundations of Concrete on Wood Piles at New Orleans

THE port of New Orleans is rebuilding the Bienville St. and Mandeville St. wharves, the latter having been destroyed by fire last spring. Contracts for the foundations were awarded in June, 1930, for $125,953 and $59,688 respectively. Foundations for the Bienville St. wharf will be concrete placed at low-water elevation on wood piles. For the Mandeville St. wharf they will be concrete placed at about 3 ft. above mean low-water elevation on creosoted piles, which will be used throughout to enable the contractor to place the concrete at higher elevations should a rise in the river occur during the period of concreting. In the Bienville St. wharf, a steel sheetpile cofferdam will be driven if the river rises while concrete is being placed. All piles are to be delivered on cars on the shore side of the wharves. Untreated piles will be furnished by the contractors, and creosoted piles by the board. The board will sluice the silt deposit on the river bank, leaving a small amount of excavation for the footings to be done by the contractors. Spoil from the ex-

UNIT PRICES OF BIENVILLE ST. WHARF

| | A | B |
|---|---|---|
| I—Furnishing Untreated Piles | | |
| 240 85-ft. | $26.64 | $28.95 |
| 500 80-ft. | 22.36 | 22.80 |
| 300 75-ft. | 20.25 | 18.34 |
| 250 70-ft. | 18.20 | 15.05 |
| 240 65-ft. | 16.25 | 12.05 |
| 270 60-ft. | 13.40 | 10.50 |
| 2,040 piles unloaded and driven | 6.90 | 8.70 |
| 3,800 piles cut off | .50 | .30 |
| 380 cut-offs brush treated | .10 | .12 |
| II—Excavation and Backfill | | |
| 1,500 cu.yd on river side of bulkhead | .80 | 1.44 |
| 75 cu.yd. on land side | 1.50 | 1.20 |
| 240 sq.yd. slab removed | .80 | .72 |
| III—Reinforced Concrete and Bolts | | |
| 20,000 sq.ft. form bottoms | .23 | .215 |
| 3,800 cu.yd. footings, column pedestals and struts | 14.00 | 13.88 |
| 600 cu.yd. wall with pilasters and footings along timber bulkhead | 14.95 | 14.00 |
| 75 cu.yd. chain wall on levee | 15.00 | 14.50 |
| 2,566 anchor bolts, 1¼ x 2 to 4-in. | 1.71 | 1.80 |
| 244 bolts, 1¼ x 15-in. | 1.25 | 1.60 |
| Totals | $125,953 | $126,305 |

UNIT PRICES OF MANDEVILLE WHARF

| | A | B |
|---|---|---|
| I—Piling | | |
| 1,250 piles unloaded and driven | $5.65 | $8.00 |
| 3,650 piles cut off | .28 | .20 |
| 3,500 piles brush treated | .10 | .10 |
| II—Excavation | | |
| 1,050 cu.yd. | .70 | .80 |
| III—Reinforced Concrete and Bolts | | |
| 2,000 sq.ft. form bottoms | .16 | .215 |
| 3,900 cu.yd. footings, pedestals and struts | 10.65 | 13.45 |
| 3,286 anchor bolts, 1¼ x 2 to 4-in. | 1.69 | 1.41 |
| Totals | $59,688 | $74,478 |

cavations may be thrown up between trenches or wasted in the river. No backfill is required.

Concrete work in both wharves consists of foundations for the steel framing placed at low water elevation and, in the Bienville St. wharf, a concrete chain wall along the top edge of the levee and a wall along the timber bulkhead. Anchor bolts for the steel wharf framing will be set in the concrete. The maximum water-cement ratio is 7.5 gal.

In both jobs, one unit price is quoted for unloading and driving the different lengths of piles, and a separate price is quoted for cutting off. Brush treating of creosoted piles, where required, consists of two coats of hot creosote oil. Unit prices are given for the lowest two bidders on each job: Bienville—(A) Dalgarn Construction Co.; (B) B. N. Davis: both of New Orleans; Mandeville—(A) Thomas Carey; (B) B. N. Davis, both of New Orleans.

## Open Drainage System in South Dakota

The Belle Fourche project in South Dakota is an extensive system of open drains. Work is divided into three schedules, and excavation of drains amounts to 85 to 90 per cent of the cost of each schedule. The remaining items

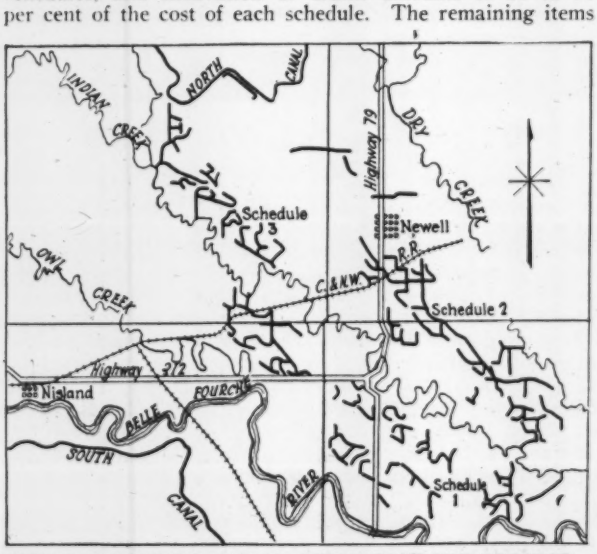



FIG. 1—LOCATION MAP OF BELLE FOURCHE PROJECT

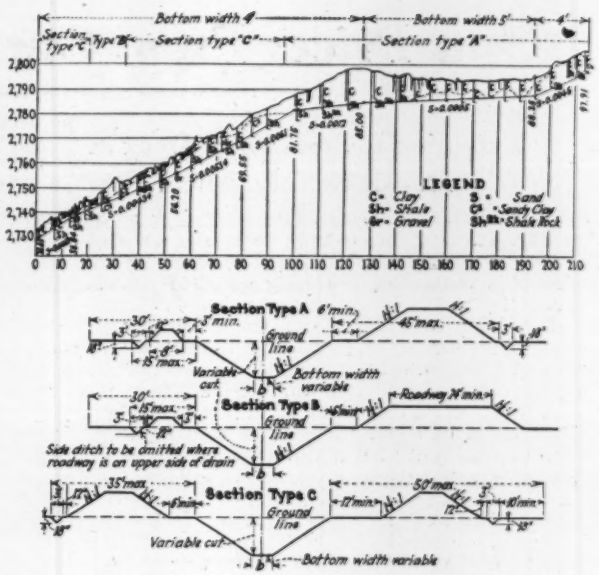



FIG. 2—PROFILE OF OPEN DRAIN 42, ON WHICH THE THREE TYPES OF SECTIONS ARE USED AND THE TYPES

These three plans of disposal are used where drain is: (*A*) located on level or moderate cross slope, the larger spoilbank being placed on the higher side of the drain; (*B*) along a highway; (*C*) in trough of a slough. Level peaks of spoilbanks of *A* and *C* with three or more passes of the bucket each move. Level roadway of *B* to permit final leveling with teams.

are 12- to 24-in. corrugated metal pipe and metal flumes. Contract was awarded by the U. S. Bureau of Reclamation in the latter part of March to Kramer & Hog, Minneapolis, for $159,208. Contract unit prices are given on the combined schedules, and those of the second lowest bidder on the whole project, which was A. Guthrie & Co., Inc., St. Paul. The W. H. Pucket Co., Boise, was second lowest on schedule 2, the only section on which this company bid. Its

| | A | B |
|---|---|---|
| 1,385,000 cu.yd. excav. of drains | $0.10 | $0.12 |
| 2,360 cu.yd. excav. for structures | 1.00 | 1.25 |
| 14,000 cu.yd. backfill at structures | .30 | .35 |
| 2,000 cu.yd. puddled backfill | .50 | .75 |
| 170 cu.yd. concrete | 27.00 | 30.00 |
| 7,200 lb. reinf. placed | .02 | .02 |
| 2,750 lin. ft. driving piles | .60 | .50 |
| 103 M ft. b.m. erect. bridges, per M. | 25.00 | 40.00 |
| 12 M ft. b.m. erect. flumes, per M. | 50.00 | 60.00 |
| Laying Corrugated Metal Pipe | | |
| 1,460 lin.ft. 12-in. | .16 | .40 |
| 4,100 lin.ft. 15-in. | .20 | .45 |
| 290 lin.ft. 18-in. | .25 | .50 |
| 3,930 lin.ft. 24-in. | .35 | .55 |
| 820 lin.ft. 30-in. | .40 | .60 |
| 200 lin.ft. 36-in. | .45 | .70 |
| 330 lin.ft. No. 42 metal flume | .40 | .80 |
| 150 lin.ft. No. 48 metal flume | .50 | 1.00 |
| 19 M ft. b.m. treating timber, per M. | 18.00 | 18.00 |
| 6 miles moving excavating machine, per mile | 20.00 | 50.00 |
| | $159,208.00 | $193,433.00 |

price for excavation was 12c., same as Guthrie's, but its other prices agreed closely with those of the low bidder. The material is sand, clay, gravel and shale.

Reinforced-Concrete Highway Bridge on Nogales highway, Tucson, Ariz. (F.A.P. 29), was awarded in August, 1930, for completion Sept. 17, to L. C. Lashmet, Phoenix, for $6,804, or 5 per cent below the second bid and 8 per cent below the average of the five bids received. The contract unit prices and the average prices are given below:

| | Contract | Average Five Bids |
|---|---|---|
| 800 cu.yd. drainage excav. | $0.32 | $0.34 |
| 633 sq.yd., remove old conc. pav. | .50 | .39 |
| 427 sq.yd. conc. pav. except steel | 3.25 | 2.87 |
| 275 cu.yd. unclassified excav. | 2.00 | 1.14 |
| 207 cu.yd. class A conc. | 19.00 | 20.00 |
| 16,474 lb. reinf. steel | .087 | .065 |

# CONSTRUCTION NEWS

## Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

| Location | Project | Cost | Status |
|---|---|---|---|
| **Waterworks** | | | |
| Pasadena (Calif.) | Waterworks dam | $10,000,000 | Proposed |
| Oklahoma City | Filter plant addition, etc. | 1,153,000 | Proposed |
| Hamilton (Ont.) | Filtration plant | 1,000,000 | Proposed |
| **Sewers** | | | |
| Richmond (Ind.) | Sewage disposal plant | 1,000,000 | Proposed |
| Oklahoma City | Sewers and disposal plant | 2,450,000 | Proposed |
| Dallas (Tex.) | Sewage disposal plant | 1,700,000 | Proposed |
| **Streets and Roads** | | | |
| South Carolina | Paving | 2,225,000 | Bids asked |
| **Sports and Parks** | | | |
| California | Playgrounds, etc. | 1,500,000 | Proposed |
| **Factories and Mills** | | | |
| Colorado | Paper mill | 2,500,000 | Proposed |
| Terre Haute (Ind.) | Factory | 1,000,000 | Contract |
| **Buildings** | | | |
| New York | Apartment | 1,400,000 | Separate contracts |
| Oklahoma City | Bank | 3,000,000 | Bids asked |
| San Francisco | Club | 2,000,000 | Bids asked |
| Boston | Hospital | 3,000,000 | Proposed |
| Riverside (Calif.) | Sanatorium | 1,000,000 | Proposed |
| New York | Hospital | 1,000,000 | Bids asked |
| New York | Hospital | 3,000,000 | Proposed |
| San Francisco | Office | 2,000,000 | Proposed |
| New York | Office | 5,000,000 | Proposed |
| New York | Office | 10,000,000 | Proposed |
| New York | Office | 3,000,000 | Contract |
| Santa Barbara (Calif.) | Schools | 1,000,000 | Proposed |
| Gary (Ind.) | High school | 1,000,000 | Proposed |
| Cambridge (Mass.) | University | 2,000,000 | Contract |
| New Bedford (Mass.) | High school | 1,500,000 | Proposed |
| Lawrence (Mass.) | Theatre, etc. | 1,000,000 | Proposed |
| New York | Theatre | 1,000,000 | Proposed |
| New York | Seamen's home | 1,000,000 | Bids asked |
| New York | Freight terminal | 9,000,000 | Proposed |

## WATERWORKS

### PROPOSED WORK

**Calif., Pasadena**—City dam at Pine Canyon site in San Gabriel Canyon, 295 ft. high above canyon floor, 377 ft. high above foundation base, incl. 720,000 cu. yd. concrete, 682,000 bbl. portland cement, 1,500,000 lb. reinforcing and 1,000,000 lb. structural steel, 1,250,000 lb. gates, valves, also 17.8 mi. conduit from Pine Canyon to Mountain Street Reservoir, incl. 14,000 lin. ft. concrete pressure tunnel, 56,000 lin. ft. 60 in. pipe line (probably steel) and 24,100 lin. ft. pipe line (probably rein.-con.) $10,000,000 bonds voted. S. B. Morris, ch. engr. City Water Dept.

**Ind., Jeffersonville**—Div. Forestry, Indianapolis, 11 m.g. reservoir for irrigation purposes on state forestry reserve, Clark Co.

**Ia., Burlington**—Citizens Water Co., F. D. Lawler, supt., preliminary surveys waterworks improvements, incl. stand pipe, 12 in. main, $60,000. New pumping building and equipment, $19,860; mechanical mixing equipment $9,780; 2 additional filters $10,000. Norwood Eng. Co., engrs.

**Mass., Lexington**—Town sketches drainage system, Vine Brook. To exceed $15,000. Metcalf & Eddy, State Bldg., Boston, engrs.

**O., Cincinnati**—Waterworks, 10 year program. Burns & McDonnell Eng. Co., 400 Interstate Bldg., Kansas City, Mo., engrs.

**Okla., Hartshorne**—Postponed indefinitely, waterworks extensions, retaining wall. $25,000. C. T. Coffrin, city clk.

**Okla., Oklahoma City**—Preliminary plans mains, filter plant addition, elevated tanks $1,153,000. G. F. Brown, City Hall, engr.

**Wash., Mt. Vernon**—Citizens Com. named to investigate, recommends establishment municipal water system, est. $258,925, incl. installation pipe, $127,000, 2 m.g. filter plant, sedimentation basin, $40,000, reservoir, $30,000.

**W. Va., Moundsville**—Bids in late fall, new 1½ m.g.p.d. electric driven pumping plant, drilling wells, $50,000. D. Morrow, dist. manager for Supervising Engineers, Inc., 42 Cedar St., New York. Noted Sept. 4.

**Ont., Hamilton**—W. L. McFaul, city engr., bids early in December, new waterworks filtration plant. $1,000,000. Noted July 31.

### BIDS ASKED

**Calif., Fullerton**—Oct. 7, by F. C. Hazmalhaich, city clk., 14,780 ft. 6- to 12-in. c.i. water pipe, 21,550 lb. fittings, miscellaneous valves.

**Ill., Lewistown**—Sept. 29, by S. Campbell, city clk., 4,450 ft. 4 in. c.i. pipe, 2,600 lb. c.i. special castings, 5 double nozzle fire hydrants, six 4 in. gate valves and boxes, 5 cut-ins complete on old distribution system, 3 cut-ins (plug removed only). W. A. Fuller Co., 2916 Shenandoah Ave., St. Louis, Mo., engrs.

**Mass., Norfolk**—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

**Mass., Waltham** — Superintendent P. Wks., taking bids high pressure water plant, incl. standpipe, pump house and pumps. $50,000. Noted Sept. 11.

### CONTRACTS AWARDED

**Calif., San Diego**—San Diego State Teachers College, water, steam sewer and service lines on campus grounds, to W. H. Robinson, Los Angeles, $25,676.

**Calif., Whittier**—To Chapman Valve Mfg. Co., 2314 East 8th St., Los Angeles, two 30 in. 150 lb. gate valves $650, one 30 in. 100 lb. gate valve $525, two 24 in. 100 lb. gate valves $325.

**Ga., Madison**—City, filter plant, reservoir, to W. A. Kinney, Lithonia.

**Ill., Chicago**—Bd. Local Impvts., City Hall, c.i. water supply pipes, special casting, c.i. fire hydrants, valves, brick valve basins in North Whipple St., North Long, North Moody, North Nordica and Rascher Ave., to Simon Ryan, 2927 West Congress St.; West 79th and 82nd Places, South Laramie, South Seely, South Hoyne and South Hamilton Aves., to M. J. Bohan, 1105 West Garfield Blvd.; Wentworth Ave., to M. Murphy, 5753 South Peoria St. Noted Aug. 28.

**Mont., Great Falls**—For 10,000 lin.ft. c. i. mains, to National Cast Iron Pipe Co., Tarrant City $58,137 with metropolitan pipe $62,360; installing 7,815 lin. ft. 20 in. pipe, to J. P. Humphrey, Great Falls, and J. O'Connor Constr. Co., Shelby, $8,525.

**N. Y., Dunkirk**—Director R. Wks., 500,000 gal. clear water reservoir, to Moore Constr. Co., 177 Elk St., Buffalo. Est. $33,000.

**O., Cleveland**—Cuyahoga Co., 12,000 ft. 6- to 16-in. c.i. mains, Warrensville Center Rd., Impvt. 563, to Hanna & Co., Scranton Rd., $45,888.

**Pa., Pittsburgh** — Bd. P. Wks., City Hall, foundation for 28 m.g. pump at Brilliant Pumping Station, at Aspinwall, to J. W. Maglaughlin, Bulletin Bldg., $9,250.

**Tenn., Livingston**—Town, A. F. Officer, recdr., 47,100 lin. ft. 2- to 8-in. pipe lines, settling basin, pump room and chemical house, collection system for springs, Marine engine driven centrifugal pump, motor driven centrifugal pump, chemical machine, chlorinator, 1 m.g. steel reservoir, fire hydrants, valves, basins, and other structures, to Utilities Constr. Co., Inc., South Bend, Ind., $54,588. Est. $60,000.

**Wash., Anacortes**—Waterworks, incl. 16 mi. 16- to 24-in. steel pipe and 8- to 10-in. c.i. pipe, intake, pier, screen chamber, pumphouses, coagulating basin, to Puget Sound Mchy. Depot, 322 1st Ave. S., Seattle $444,392. Noted Sept. 4.

**Wis., Fond Du Lac**—City, 500,000 gal. tank, to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. and Tuttle and S. W. 10th Sts., Des Moines, Ia.; centrifugal and deep well pumps, to American Well Works, Aurora, Ill. Noted Aug. 14.

**Wis., Milwaukee** — Dpt. P. Wks., D. McKeith, comr., mains in North Humboldt Ave., to Hohensee, 1282 10th Ave., $35,091; North Humboldt Ave., to J. Brogan & Sons, 264 Prospect Ave., $37,310; East Florida St., to Wenzel & Henoch Co., 5025 State St., $3,303; North Bway., to Kehrein Bros., 750 17th St., $4,663. Grand total $80,367.

## SEWERS

### PROPOSED WORK

**Ill., Glen Ellyn**—Bids in spring, sewage disposal plant, outlet sewerage system. $640,000. Wells Eng. Co., Geneva, engrs.

**Ind., Richmond** — Sewage disposal plant. $1,000,000. D. B. Davis, Richmond, engr.

**Mich., Grand Haven**—For concrete or vitr. tile sewers, sewage treatment plant. $225,000 bond election soon. Pearse, Greeley & Hansen, 6 North Michigan Ave., Chicago, Ill., engrs.

**N. J., Plainfield**—Common Council, City Hall, storm water sewer, in eastern part city. $320,000. A. Vars, city engr.

**N. Y., Spencerport**—Sewage disposal plant. $160,000 voted. W. S. Lozier, 10 Gibbs St., Rochester, engr.

**O., Warren**—City, Dpt. P. Serv., will not take bids about Nov. 29, storm water sewerage system. A bond issue of $980,000 is being voted upon at the November election for storm trunk and relief trunk sewers in various portions of City, but work will not be up for letting until sometime in the Spring of 1931. This corrects report in Sept. 11 issue.

**Okla., Oklahoma City**—Preliminary plans new sewage disposal plant, $1,050,000; storm sewer extension, $1,250,000; sanitary sewer extension, $150,000. G. F. Brown, City Hall, engr.

**Pa., Pittsburgh**—Sewers in Independence St., $180,000. C. M. Reppert, City-County Bldg., engr.

**S. D., Sioux Falls**—City, W. C. Leyse, auditor, storm sewers in South Side. $30,000.

**Tex., Dallas**—City, c/o E. Goforth, secy., 1 story, brick, rein.-con. sewage disposal plant, steel sash, activated sludge type. $1,700,000. Hawley, Freese, Nichols, 417 Capps Bldg., Fort Worth, consult. engrs. W. S. Tanner, Dallas, sewerage engr.

**Wis., Milwaukee**—Sewerage Comn., 1 story, 102 x 207 ft., milorganite storage building at sewage disposal plant. $160,000. J. L. Ferebee, ch. engr. Soon takes bids piles for same.

### BIDS ASKED

**Calif., Redondo Beach** — Oct. 2, by C. C. Mangold, city clk., storm drains, incl. 1,300 ft. rein.-con. and corrugated iron pipe, catch basins, manholes in Sapphire St. between Bway. and Pacific Ocean.

**Ill., Chicago**—See "Streets and Roads."

**Ill., Peoria**—Oct. 20, by Bd. Trustees Peoria Sanitary Dist., 531 Peoria Life Bldg., Div. H, intercepting sewers, appurtenances; adv. E. N.-R. Sept. 25.

*See proposal advertising on page 107*

*Constr. News page 125*

# LEADITE

## LEADITE is "equally effective" for either General or Emergency Work

### Front Royal Gets Water Supply Quickly

Front Royal, Va.—Faced with a shortage of water because of drought conditions, the city council of Front Royal met at 8 P. M. August 5 and appointed a committee composed of H. H. Marlowe, E. D. Stokes and L. B. Dutrow, town manager, to consider the situation. This committee rendered its report on August 6 and recommended a pump on the Shenandoah River, with an 8-inch line to the present filters of 1,000,000 gallons daily. Council approved the recommendations and awarded contract that night to Allen J. Saville, Inc., Richmond, whose forces worked daily from 5 A. M. to 10 P. M. and pumped water to the filters at 4 P. M. August 15, thirty-two hours ahead of schedule. A pump of 800,000 gallons daily capacity manufactured by the Pomona Pump Co., Pomona, Cal., was furnished by the Sydnor Pump & Well Co., Richmond, with a 75-horsepower motor, and 10,000 feet of 8-inch cast iron pipe was supplied by the Glamorgan Pipe & Foundry Co., Lynchburg, Va. Leadite, made by the Leadite Co., Philadelphia, Pa., was used in the pipe line.

*The Pioneer self-caulking material for c. i. pipe.*
*Tested and used for over 30 years.*
*Saves at least 75%*

THE LEADITE COMPANY
Land Title Building Philadelphia, Pa.

**No Caulking**

Sewers (Continued)

**Md., Baltimore**—Oct. 1, by Bd. Awards, furnishing, delivering vitr. terra cotta pipe to Bureau Sewers, Material Contr. 81; sanitary sewers in Contr. 200; furnishing, installing mechanical and electrical equipment at Highlandtown Drainage Pumping Station, Eastern Ave. and Pennsylvania R.R., Storm Water Contr. 147.

**Mass., Boston**—Oct. 2, by Metropolitan Dist. Comn., Ashburton Pl., constructing Sect. 114, New Neponset Valley Sewer, South Metropolitan System, Canton, involving 5,800 lin. ft. excav. for 54 x 60 in. concrete sewer, 25 cu.yd. brick masonry, 6,400 cu.yd. concrete masonry, 50 cu.yd. boulder concrete masonry, 1,500 cu.yd. rock excav; Sect. 115, 4,345 lin. ft. earth excav. for 54 x 60 in. concrete sewer, 1,705 lin. ft. excav. for 33 x 36 in. concrete sewer, 40 cu.yd. brick masonry, 5,600 cu.yd. concrete masonry, 50 cu.yd. boulder concrete masonry.

**N. Y., New York**—Sept. 26, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Ave., sewers in Magenta St., Swinton and Holland Aves.

**N. Y., Ogdensburg**—Oct. 8, by Bd. Pub. Control, 2,675 lin.ft. 42 in. sewer, manholes. C. H. Lord, city engr.; adv. E. N.-R. Sept. 25.

**O., Cleveland**—Sept. 26, by City, 1,800 ft. concrete drain at southerly sewage treatment plant. $45,000. G. B. Gascoigne, Leader Bldg., engr.

**Pa., Pittsburgh**—Oct. 14, by M. C. Smith, secy. Shaler Twp., Mt. Royal Blvd., 116,300 ft. 8- to 24-in. terra cotta sewers, 400 manholes, 64 lampholes, appurtenances, in Dists. 1, 1-A, 2 and 3, Shaler Twp. F. G. Ross, 309 4th Ave., engr.

**Ont., Sudbury**—Oct. 6, by W. J. Ross, city clk., sewage disposal plant, garbage destructor, incl. excav., buildings, ramps, screen room, furnaces, 75 ft. stack, oil heating system with unit heaters, rein.-con., brick construction. $250,000-$300,000. F. A. Dallyn & Co., 71 King St. W., Toronto, engrs. Noted Sept. 11.

**CONTRACTS AWARDED**

**Calif., Los Angeles**—Los Angeles Co., 8- to 21-in. vitr. sewers with concrete cradle manholes, in Alliene Ave., Cypress St., et al, Impvt. 727, to Torson Constr. Co., 1290 West Anaheim St., Long Beach, $61,101.

**Calif., Los Angeles**—See "Streets and Roads"

**Calif., San Diego**—See "Waterworks."

**Ga., Vienna**—City, 13,000 lin.ft. sewer mains and 6 ft., water mains, to Odiarne Constr. Co., Clinton, N. C.

**Ill., Chicago**—Bd. Local Impvts. City Hall, tile sewers with brick manholes, brick catch basins in Higgins Ave., and across private property 1 alley, East 93rd St., Kinney, East End, Ridgeland, Creiger, Constance and Bennett Aves., to A. Scully, 4504 Wrightwood Ave.; system tile sewers, brick manholes, brick catch basins in West 55th St., Archer, South Austin, South McVicker, South Meade, South Moody, South Melvina and South Merrimac Aves., to L. Scully, 82 West Washington St.; Gregory St., South Major, South Massasoit, North Natoma, Higgins, North Normandy, Catalpa, Rascher, Talcott, North New Castle, North New England, North Oak Park and North Sayre Aves., to Mancini & Ventrella. Noted Aug. 28.

**Ill., Chicago**—See "Streets and Roads."

**Ill., Niles Center** — City, Emerson Street Sewers, 8- to 42-in. pipe, to Canel Conrad Constr. Co., Evanston, $130,333.

**Md., Baltimore** — Mayor and City Council, sanitary sewers, Contr. 265, to D. Cellinese, 213 South High St., $33,035. Noted Sept. 4.

**Mass., Boston**—City, Dpt. P. Wks., sewerage works in Lasell St., West Roxbury, to A. Cefalo, 19 Cefalo Rd., West Roxbury. Est. $25,000.

**Mass., Springfield**—Sanitary and storm sewers in various sections. $900,000. Owner builds. D. R. Winter, mayor.

**Minn., Willmar**—H. Gunderson, city clk., sewage disposal plant, outfall sewer, to T. Jenson, St. Cloud, $141,091. Noted Sept. 4.

**Neb., Deshler**—Sewage disposal plant, incl. 4,422 lin.ft. 12 in. sewage pipe, manholes, bulkhead, to Chambers Constr. Co., 710 1st Natl. Bank Bldg., Lincoln, $18,345.

**N. Y., Brooklyn**—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, sewers in Avenue X to J. DeGregory, 53 Dry Harbor Rd., Maspeth, $796,029; Ocean Ave. to Matazarro & Yondola, $5,176; Hine St., to N. Fornara, $1,050. Grand total $802,260. Noted Sept. 4.

**N. Y., Elmsford**—Bd. Village Trustees, sanitary sewers, to Roach Thompson Corp., Exchange St., Rochester, $132,080. Noted Sept. 11.

**N. Y., New York**—J. Miller, pres., Manhattan Boro, Municipal Bldg., sewer in Fulton St., to Murphy & Richmond, 50 New St., $47,283. Noted Aug. 28.

**O., Cleveland**—Cuyahoga Co., 8,500 ft. 36- to 66-in. brick tile sewers, Ridge Rd. to Behrwald Ave., to Gallagher Burke Constr. Co., 19940 Roslyn Dr., Rocky River, $187,475.

**O., Wickliffe**—Village, 3,200 ft. vitr. clay sanitary and storm sewers to Iafornaro-Galitto Co., Citizens Bldg., Cleveland, $26,948.

**Pa., Pittsburgh** — E. G. Lang, City-County Bldg., to F. Mannella & Sons, 1507 North Lang Ave., sewers in Ashby St. $5,094, Lagoda and Tuxedo Sts, $4,923, drains in Undercliff St. $1,941; to Le Donn & Casper, 7305 Frankstown Ave., sewers in Balzac and Lindley Sts. $2,616, drains in Frick Park $4,571; to Bucci Constr. Co., Boquet, drains in McDonoughs Run $1,574, Dorchester Ave. $3,053; to A. V. Diulius, 3903 Boquet St., Oswald St. $3,913; to H. J. Flaherty Co., 5205 Dearborn St., McLain Way, $931; to F. Ventresco, 3306 Shady Ave., Schenley Park, $919; to Dunn & Ryan Mfg. Co., 3918 Swineburn St., catch basins in Dickens St., Wealth and McClure Aves., $3,561. Grand total $33,696.

**Pa., Girard**—Sanitary sewerage system, to J. McCormack, 1345 West 10th St., Erie, $33,000.

**Ont., Hamilton**—City, general contract rein.-con sewage disposal plant, Depew St., to W. H. Cooper, 42 James St. N., $57,764; plumbing, heating, electrical work, to Adam Clark Ltd., 7 Main St. W., $11,122.

## BRIDGES

**PROPOSED WORK**

**Calif., Long Beach**—For 1,335 ft. rein.-con. bridge with 70 ft. roadway, two 7 ft. walks over flood control channel at Anaheim St. $275,000. A. H. Adams, dir. pub. serv.

**N. J. Rahway**—Bd. Freeholders Union Co., Court House, Elizabeth, strengthening and widening bridge over Rahway River, at Lawrence St. $25,000. R. Collins, Court House, Elizabeth, co. engr. Noted Sept. 18.

**Okla., Ada**—Preliminary plans new viaduct over Oklahoma City. Ada & Atoka Ry. Co. tracks at 7th St. $40,000. G. Toler, Ada, engr.

**Okla., Oklahoma City**—Rein.-con. bridge at Central Ave., $775,000; preliminary plans Dewey Avenue Viaduct, rein.-con., $290,000. G. F. Brown, City Hall, engr.

**BIDS ASKED**

**Calif., Los Angeles**—Oct. 6, by Bd. Supervs. Los Angeles Co., 63 ft. rein.-con. bridge, wood pile foundation over Avalon Blvd. and Nigger Slough.

**Iowa**—Sept. 30, by State Hy. Comn., Ames, **(P. means Project)** two 70 x 20 ft. and one 60 x 20 ft. pony truss span bridge, 13 culverts, extensions, St. Anagar Rd., P. B-542 Mitchell Co.—4 culverts, extensions McGregor Rd., P. B-671 Clayton Co.—16 culverts, extensions Monticello Rd., P. B-687 Jones Co.—32 culverts, extensions P. B-615 and B-21, Pottawattamie Co.—one 54 x 24 ft. span and two 44 x 24 ft. span I-beam railroad crossing west of Meridian, P. X-928 Cherokee Co.—five 51 x 24 ft. span and one 36 x 24 ft. span I-beam railroad crossing south of Monette, P. X-933 Union Co. C. R. Jones, aud.

**Maryland**—Sept. 30, by State Roads Comn., structural steel girder superstructure for bridge, Contr. AA-101-73, Anne Arundel Co. G. C. Uhl, chn. Baltimore; adv. E.N.-R. Sept. 25.

**Massachusetts**—Sept. 30, by Dpt. P. Wks., Boston, rein.-con., stone, arch bridge and bituminous macadam approaches, between Dover and Needham; rein.-con. bridge, gravel approaches, Medway. A. W. Dean, Dpt. P. Wks., engr.

**Mass., Groveland** — Sept. 26, by Essex Co., R. H. Mitchell, Court House, Salem, rebuilding Groveland Bridge, concrete. $25,000. R. E. Evans, Court House, Salem, co. engr.

**Minn., Minneapolis**—Oct. 6, by Hennepin Co., Court House, Bridge 10, rein.-con., Project 922, on County Rd. 7. $26,975. W. E. Duckett, Court House, co. engr.

**Miss., Oxford**—Oct. 7, by Bd. Supervs. Lafayette Co., 200 ft. bridge on Oliver Levee, Beat 5—135 ft. bridge on Jone Creek, on Taylor-Water Valley Rd., Beat 2—120 ft. bridge on Upper Cypress Creek Levee over Ward Creek, Beat 2—also 1 building at County Home.

**North Carolina**—Sept. 30, by State Hy. Comn., Raleigh, rein.-con. bridges, culverts on P. 358, New Hanover Co. $97,300. J. D. Waldrop, Raleigh, engr.

**South Carolina**—See "Streets and Roads."

**CONTRACTS AWARDED**

**California** — State Hy. Comn., Sacramento, seven 35 ft. span rein.-con. bridge on concrete pile bents and concrete abutments, pile foundation, with 34 roadway over Castaic Creek, near Castaic Junction, Los Angeles Co., to Carpenter Bros., Inc., Beverly Hills, $31,149. **Noted Aug. 21.**

**Ill., Chicago**—Cook Co., County Bldg., bridge at Oakton St., to Paschen Bros., 33 North La Salle St., $80,000; 2 culverts at 103rd St. and Ridgeland Ave., to Seymour Constr. Co., 19 South La Salle St., $13,000.

**Ind., Evansville**—Bd. Comnrs, Vanderburgh Co., 3 span rein.-con. bridge 66 ft. over Pigeon Creek, at Franklin St., to National Concrete Co., 1017 Lemcke Bldg., Indianapolis, $166,500. Est. 175,000. Noted Sept. 4.

**Kentucky**—State Hy. Dpt., Frankfort, to J. M. Parker Co., Frankfort, concrete substructure and approach spans bridge in Gallatin Co., $20,976; Lewis Co., $20,472; concrete superstructure, substructure and approaches bridge in Morgan Co., $30,875—to Brookville Bridge Co., Brookville, O., steel superstructure bridge in Gallatin Co., $13,243 — to E. R. Mills, Charleston, W. Va., Lewis Co., $29,946—to International Steel & Iron Wks., Evansville, Ind., Morgan Co., $11,997. Grand total $127,509.

**Kentucky**—State Hy. Dept., Frankfort, concrete, steel bridge on U. S. Hy. 60, Shelby and Franklin Counties, to G. M. Eady Co., 340 Byrne St., Louisville, $27,809. Noted Aug. 7.

**Maryland**—State Roads Comn., Baltimore, structural steel superstructure, bridge, Contr. H-100-42, Hartford Co., to Shumaker Bridge Co. of Delaware, Phila., Pa., $7,462. Noted Aug. 28.

**Miss., Canton**—See "Streets and Roads."

**Miss., Natchez**—Bd. Supervs. Adams Co., reconstructing and additions rein.-con., steel bridge over St. Catherines Bayou, on Lower Natchez-Woodville Rd., incl. 2 concrete piers, 1 concrete abutment, 51 ft. I-beam span, concrete slab deck, to Littrell Constr. Co., Millry, Ala., $17,486. Est. $27,533. Noted July 31.

**New Hampshire** — State Hy. Dpt., Concord, substructure bridge, concrete approaches, Bristol, to Caughey & Pratt, Antrim, $18,707—superstructure for same bridge, to Boston Bridge Wks., Inc., Binney St., Cambridge, Mass., $41,837—deck plate girder bridge, Bartlett, to C. D. Marsh Constr. Co., Woodsville, $27,040—graveling 0.17 mi. hy, Warner, to A. D. Bridges & Sons, Hazardville, Conn., $3,280. Grand total $90,864.

**New Jersey**—State Hy. Dpt., Trenton, bridges on Route 34, Sect. 2, Monmouth Co., to S. S. Thompson Co., Red Bank, $48,328; transformer house equipment, to J. C. Moore, Jersey City, $2,100. Noted Aug. 28.

**N. J., Union Beach**—Monmouth Co., Court House, Freehold, Bridge R-3 over Broadway, to T. Proctor, Long Branch, $10,485. Noted Sept. 18.

**Okla., Altus**—Jackson Co., three 80 ft. steel truss and eight 25 ft. timber approach span bridge over Turkey Creek, State Aid Project 646-B, between Red River and Altus, to Mackey & Hopper, 325 Natl. Bank Bldg., Oklahoma City, $27,558.

**Okla., Elmer**—Jackson Co., 3 span 240 ft. steel truss bridge on concrete piers, to Mackey & Hopper, Liberty Bank Bldg., Oklahoma City, $27,558. Est. $30,000.

**Pennsylvania**—Bd. Comrs. Lehigh Co. (Allentown) and Bd. Comrs. Northampton Co. (Easton), steel, concrete bridge over Lehigh River, Lehigh Valley R.R., Central Railroad of New Jersey, Lehigh Coal & Navigation Co. Canal, between Copley, Lehigh Co. and Northampton, Northampton Co., to Whittaker & Diehl, Harrisburg, $495,750. Noted Aug. 28.

**South Carolina**—State Hy. Dpt., Columbia, superstructure bridge Beaufort Co., to Dewey Bros., Goldsboro, N. C., $32,722—substructure same bridge, and 2 rein.-con. bridges Horry Co., to Simons-Mayrant Co., Charleston, $73,650 and $16,993 respectively — rein.-con. bridge Chester Co., to R. H. H. Blackwell, Kingsport, Tenn., $41,917—2 rein.-con. bridges Greenwood Co., to F. E. Peake & Co., Columbia, $20,750 — rein.-con. bridges Lancaster and Newberry Counties, to C. D. Fulmer, Leesville, $9,451 and $23,654 respectively — rein.-con. bridge Marlboro Co., also raising existing bridge Horry Co., to Wannamaker & Wells, Inc., Orangeburg, $6,522 and $793 respectively—Chester Co., to P. Gilmore, Spartanburg, $3,563. Grand total $230,015. Noted Aug. 28.

**Tenn., Knoxville** — City, at office G. R. Dempster, city mgr., Henley Street Bridge, steel, concrete over Tennessee River, to Booth & Flinn Co., 1942 Forbes St., Pittsburgh, Pa., $948,742. Noted Aug. 14.

**Texas**—G. Gilchrist, state hy. engr., Austin, bridges on hys. in Aransas Co., to Cage Constr. Co., Taft, $42,213 est. $56,000—Tarrant Co., to Purvis & Bertram, 1124 West 9th St., Fort Worth, $34,710 est. $36,000—Motley Co., to E. Lembke, Amarillo, $56,205 est. $56,000 — Culberson Co., to Gifford-Hill Co., Inc., North Texas Bldg., Dallas, $35,332 est. $44,000 — Refugio Co., to E. Artmann, Box 672, Giddings, $51,416 est. $74,000—Harris Co., to Standard Contg. Co., Esperson Bldg., Houston, $197,917 est. $200,000. Grand total $417,793. Noted Sept. 11.

**Washington**—S. J. Humes, dir. State Hys., Olympia, bridge over Hoh River, F. A. 170-B, Jefferson Co., to Union Bridge Co., 1001 Porter Bldg., Portland, Ore., $84,175. Noted Aug. 21.

**West Virginia**—State Roads Comn., Charleston, Cove Bridge, Project 3114-B, Brooke Co., to Keely Constr. Co., Charleston, $20,077; North Caldwell Overhead Bridge 1226, Project 2023, Greenbrier Co., to Monty Bros., Charleston, $15,984.

**Alta., Calgary**—Canadian Pacific Ry., J. M. R. Fairbairn, ch. engr., Montreal, Que., 2 steel viaducts near here, to Hamilton Bridge Co., Hamilton, Ont., $250,000.

## STREETS AND ROADS

**BIDS ASKED**

**California**—Oct. 1, by State Hy. Dpt., Sacramento, bituminous treated crusher run surfacing 7.3 mi. San Mateo-Redwood City Rd., San Mateo Co.—grading, concrete paving 1 mi. Castaic Creek Rd.—also fifteen 19 ft. timber span bridge, with concrete deck and 41 ft. 4 in. steel beam removable span over Alamitos Bay near Long Beach, both Los Angeles Co. C. H. Purcell, hy. engr.

**California**—Oct. 8, by State Hy. Comn., Sacramento, concrete surfacing 0.3 mi. Malaga St., San Bernardino Co., grading, concrete surfacing 0.6 mi. road north of Santa Maria, Santa Barbara Co. C. H. Purcell, ch. hy. engr.

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Streets and Roads (Continued)

**Calif., Compton**—Sept. 30, by City Council, grading, curbing, guttering, sewers, watermains, walks, 5 in. concrete paving 86,000 sq.ft. Golden and Poppy Aves., et al. G. Rood, city engr.

**Calif., Long Beach**—Sept. 30, by City Council, curbing, guttering walks, waterworks, gas services, asphaltic concrete paving 102,500 sq.ft. Chestnut Ave. and 23rd St.

**Calif., Oroville**—Oct. 6, by C. F. Belding, clk. Butte Co., grading 19,662 cu.yd. Oroville-Pentz and Oroville-La Porte Rds. J. A. Bumgarner, Oroville, co. road engr.

**Calif., San Diego**—A. V. Goeddel, city purch. agt., bids about Sept. 30, grading Torrey Pines Rd., incl. 1,433 ft. 18- to 30-in. rein.-con. culvert pipe, 26 inlets, 314,314 cu.yd. embankment, 220,526 cu.yd. excav. H. W. Jorgensen, city engr.

**Calif., San Francisco**—Oct. 1, by S. J. Hester, secy. Bd. P. Wks., City Hall, improving Sect. C, Sunset Blvd., incl. 116,000 cu.yd. excav., 122,000 cu.yd. imported borrow, 195,000 sq.ft. asphalt macadam paving. $130,000. M. M. O'Shaughnessy, city engr.

**Colorado**—Sept. 30, by State Hy. Dpt., Denver, grading, gravel surfacing 1.981 mi. Craig-Hamilton Rd., to State Hy. 13, Federal Aid Project 282-I. Moffat Co.; oil processed gravel surfacing 5.992 mi. Trinidad Rd., State Hy. 12, Federal Aid Project 91-A, Las Animas Co. L. D. Blauvelt, hy. engr.

**Conn., Torrington**— Taking bids (selected list of bidders), widening, resurfacing, paving South Main St. and Winchester Rd. $45,000.

**Idaho** — Sept. 30, by J. D. Wood, comr. P. Wks., Boise, grading, crushed rock surfacing 11.003 mi. Bear Lake Hy., Bear Lake Co.

**Ill., Chicago**—Oct. 2, by City at office Bd. Local Impvts., City Hall, grading, curbing, guttering, sewers, 8 in. concrete paving East 84th and West 53rd Sts., Barry, Wellington, South Knox, South Kilpatrick, and South Keating Aves.; grading, curbing, guttering, sewers, asphalt on 6 and 8 in. concrete paving East 86th and West 83rd Sts., Schubert, Spokane, Nokomis, Navajo and Hiawatha Aves. M. J. Faherty, pres.

**Ill., Harvey**—Soon takes new bids, grading, drainage structures, curbing, concrete paving streets in Robinhood Sub-division. $100,000. F. C. Norton, city clk.

**Ill., Waterman**—Oct. 3, by Bd. Local Impvts., W. Richmond, pres., concrete paving 4,200 sq.yd. business district. W. M. Hay, De Kalb, engr.

**Ind., Evansville**—Sept. 29, by Bd. P. Wks., City Hall, removing old bricks, asphalt, rein.-con. or asphaltic concrete on 6 in. concrete paving 1,500 ft. West Maryland St. $30,820. J. D. Saunders, City Bldg., engr.

**Ind., Evansville** — Sept. 29, by Bd. Comrs. Vanderburgh Co., grading, drainage structures, rock and gravel surfacing Diefenbach Rd., Perry Twp., $18,644; grading, drainage structures, asphaltic concrete surfacing Bement Ave. in Pigeon Twp., $35,447. S. B. Bell, co. aud.

**Ind., Goshen**—Oct. 6, by Bd. Comrs. Elkhart Co., concrete paving 2 mi. Wakarusa Rd. $53,000. M. E. Croop, Goshen, aud.

**Iowa**—Sept. 30, by State Hy. Comn., Ames **(P. means Project)** grading, flumes, paving 1.322 mi. Road 13, P. P-671 Clayton Co.—0.72 mi. Road 30, P. P-344-B Hamilton Co.—0.36 mi. Road 65, P. P-555 Worth Co.—grading 0.563 mi. Road 14, P. F-7 Marion Co.—0.2 mi. Road 30, P. F-211-H Marshall Co.—0.3 mi. Road 32, P. P-635 Muscatine Co.—gravel surfacing 10.1 mi. Road 25, P. P-28 Adair Co.—3.5 mi. Road 125, P. P-662, Henry Co.—118,750 lin.ft. cable guard rail in Dist. 9, various counties—1,550 lin.ft. 6 and 8 in. drain tile complete, 65 standard intakes Road 16, P. P-643—1,350 lin.ft. 6 in. drain tile complete, 103 standard intakes, Road 16, P. P-673, both Webster Co. C. R. Jones, aud.

**Ia., Ida Grove**—Sept. 30, at office Auditor Ida Co., gravel surfacing 8.5 mi. trunk roads. G. S. Witters, Ida Grove, co. engr.

**Ia., Indianola** — Sept. 29, at office Auditor Warren Co., grading 20,000 cu.yd. local roads. D. L. Thomas, Indianola, co. engr.

**Kansas**—Sept. 30, by State Hy. Dpt., at Court House, Oskaloosa, sand gravel surfacing 6 mi. P. 73W-29-7108—0.473 mi. P. 4-31-7109—1.362 mi. P. 4-31-7110, all Atchison Co.—10 mi. P. 36-34-7105, Brown Co.—6 mi. P. 16-32-7102—9.5 mi. P. 30-35-7106—6 mi. P. 16-31-7107, Doniphan Co.—18.5 mi. P. 75-28-7120, Jackson Co.—2.5 mi. P. 30-5-7096—6 mi. P. 30-3-7097—6 mi. P. 4-26-7099, Jefferson Co.—3 mi. P. 73E-29-7115, Leavenworth Co.—3 mi. P. 11-15-7114—1 mi. P. 57-12-7095, both Lyon Co.—6.8 mi. P. 75-34-7103—8 mi. P. 36-28-7105, both Nemaha Co.—4.6 mi. P. 40N-26-7098, Riley Co.—sand gravel or chats surfacing 4.5 mi. P. 75-20-7100—10 mi. P. 50S-38-7101, both Osage Co. W. V. Buck, ch. hy. engr.

**Louisiana** — Sept. 30, by State Hy. Comn., Baton Rouge, Louisiana Natl. Bank Bldg., concrete paving 7.48 mi. Project 1401, Avoyelles and Rapides Parishes. W. H. Norckauer, hy. engr.

**La., Tallulah**—Oct. 1, by Madison Co. Police Jury, grading, gravel surfacing 9 mi. Oak Grove-Hermion-Thomastown Rd.

**Maryland**—Sept. 30, by State Roads Comn., Baltimore concrete paving 0.8 mi. Contr. Wo-77-12, Worcester Co., and 0.8 mi. Contr. CL-90-52, Carroll Co. H. J. Williar, Jr., Federal Reserve Bank Bldg., Baltimore, engr.; adv. E.N.-R. Sept. 25.

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**Md., Baltimore**—Oct. 1, by Bd. Awards, concrete paving 9,650 sq.yd. streets in Contr. 562—10,800 sq.yd. alleys in Alley Contr. 142—sheet asphalt paving 7,500 sq.yd. streets in Contr. 563—grading 40,000 cu.yd. streets Contr. 564. N. L. Smith, Municipal Bldg., hys. engr.

**Md., Easton**—Oct. 1, by Mayor and Council, concrete paving 1,600 sq.yd. West St. E. G. Kastenhuber, Jr., town engr.; adv. E. N.-R. Sept. 25.

**Massachusetts**—Sept. 30, by Dpt. P. Wks., State House, Boston, rein.-con. paving 4,000 ft., and bituminous macadam paving 200 ft. hy. Dedham. A. W. Dean, Dpt. P. Wks., engr.

**Miss., Walthall**—Oct. 6, by Webster Co. Hy. Comn., Dist. A, gravel surfacing 25 mi. Maben-Europa-Tomnolen Hy., Separate Road Dist. A; 7 mi. Clarkson-Double Branches Hy., Separate Road Dist. A. W. C. Lindley, Europa, engr.

**Mo., St. Louis**—Oct. 21, by Bd. P. Serv., City Hall, grading Newstead Ave., Berthold and Oriole Sts. $23,520. W. W. Horner, city engr.

**New Mexico**—Oct. 1, at office W. C. Davidson, state hy. engr., Santa Fe, grading, bridging, graveling 3.25 mi. F.A.P. 121-C between La Joya and Scholle, Socorro Co. — constructing State Project 530 (Carretas Bridge) on road between Las Vegas and Mosquero, San Miguel Co.

**New York**—Oct. 10, by A. W. Brandt, comr. Hys., Albany, constructing hy. in Onondaga Co.; reconstructing hys. in Orange, Otsego and Westchester Counties; adv. E. N.-R. Sept. 25.

**N. Y., Brooklyn** — Oct. 1, by J. J. Byrne, pres. Brooklyn Boro, Boro Hall, asphalt on concrete repaving Bushwick, Clinton, 10th Aves., 18th, 57th, Cook and Pacific Sts.

**N. Y., Buffalo**—Oct. 2, by G. F. Fisk, comr. P. Wks., Municipal Bldg., repaving Matthews Alley, Gibson, 19th, Godfrey and Church Sts. W. Rathman, city engr.

**N. Y., Long Island City**—Sept. 29, by G. U. Harvey, pres., Queens Boro, Queens Subway Bldg., grading, curbing, flagging, granite block on concrete paving 10th St.—grading, curbing, sidewalks, 4 ft. stone Nassau Blvd.—sidewalks on 28th St.—grading, curbing, sidewalks, sheet asphalt on concrete paving Bell Blvd., 42nd, 54th Aves., 90th, 127th, 97th, Union Hall, 82nd and 83rd Sts.

**N. Y., New York**—Sept. 26, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., granite block on concrete paving Edgewater Rd.; asphalt on concrete paving Kings College Pl., West 238th St., Cruger, Hering, Taylor, Selwyn, Paulding and Metcalf Aves.

**North Carolina**—Sept. 30, by State Hy. Comn., Raleigh, **(P. means Project)**, grading, concrete or asphaltic paving 2.51 mi. P.6920, Union Co., $26,800—2.11 mi. P.6730, Rowan Co. $37,700—3.01 mi. P. 6333, Gaston Co., $61,000—14.65 mi. P. 2620, Lenoir Co., $203,600—4.89 mi. P.2481, Jones Co., $68,200—clearing, grading 6.24 mi. P. 6830, Stanley Co., $41,000—13.22 mi. P. 5752, Moore Co., $57,300. J. D. Waldrop, Raleigh, engr.

**O., Parma** (br. Cleveland)—Sept. 26, by Village, sidewalks in Sect. B, paving Daleride Dr. and Pearlbridge Rd. To exceed $25,000. V. M. Clark, Town Hall, engr.

**O., Woodsfield**—Oct. 4, by Comrs. Monroe Co., H. J. Goddard, clk., furnishing, delivering limestone for Cooke Hollow-Beautiful Ridge Rd. and others. $26,500.

**Pa., East Pittsburgh** — Sept. 30, by R. G. Woodside, controller Allegheny Co., Court House, Pittsburgh, clearing right-of-way for State Hy. 120, incl. removing 8 buildings or parts of buildings, East Pittsburgh-North Braddock, Chalfont-Forest Hills Boro. $54,700. A. E. Griffith, 519 Smithfield St., Pittsburgh, engr.

**Pa., Pittsburgh**—Sept. 25, by E. G. Lang, dir. P. Wks., City-County Bldg., repaving Baldwin Rd., $27,000; grading, paving Breker St., $20,000. C. M. Reppert, City-County Bldg., engr.

**South Carolina**—Oct. 8, at office State Hy. Dpt., B. E. Sawyer, ch. engr., Columbia, paving 89 mi. hy., est. $2,225,000; grading 50 mi. hy. and constructing 8 bridges. Total $3,000,000.

**S. D., Lead**—Oct. 2, by City, 1 course rein.-con. paving, $25,000. H. Autio, city engr.

**Tex., San Antonio**—Taking bids 2 in. asphalt on 10 in. crushed rock paving 6 blocks Shook Ave., 30 ft. $30,000. I. Ewig, city engr.

**Virginia**—Sept. 30, by State Hy. Comn., Richmond, widening 1 mi. Richmond-Washington Hy. at Brook Hill, also widening Brook Run Bridge, Henrico Co. $75,000; grading, drainage structures 6 mi. road in Gloucester, King and Queen Counties, $25,000. Adv. E.N.-R. Sept. 25.

**Virginia**—Sept. 30, by State Hy. Dpt., Richmond, concrete widening 3.1 mi. Princess Anne Co. H. J. Spelman, ch. engr.

**Washington**—Oct. 7, by S. R. Humes, dir. State Hys., Olympia, concrete widening 1.5 mi. State Rd. 1, Snohomish Co.—concrete paving 1.8 mi. State Rd. 1, Seattle South, King Co.—7.5 mi. Old Pacific Hy., Pierce Co.—grading 2.1 mi. State Rd. 3, Kittitas Co.—4.9 mi. State Rd. 5, Lewis Co.—2.9 mi. Cascade Wagon Rd., Skagit Co.—1.1 mi Asotin-Oregon State Rd., Asotin Co.—grading, crushed stone surfacing 5 mi. State Rd. 21, Kitsap Co.

**Wash., Seattle**—Bd. P. Wks. bids about Oct. 16, concrete paving Rosemont Pl., $67,784; University Way, $49,546. R. H. Thomson, city engr.

**Ontario**—Oct. 6, by Dpt. P. Hys., Parliament Bldgs., Toronto, concrete or mixed macadam paving 5 mi. St. Thomas-Port Stanley Rd.—grading, concrete culverts, 41 mi. Petersborough Rd. easterly, Brighton Rd. northerly, Arthur Rd. east, across West Luther Twp., Greenwood Diversion, L'Original Diversion, Norwood Diversion Paris Rd. E., Blythe Diversion, and Stone Creek cut-off, grading 16 mi. 'Gananoque-Seely's Bay Rd. and Brooklin west—concrete, structural steel bridges Severn and east of Arthur. R. M. Smith, deputy minister of hys., Ontario.

**Ont., Woodstock**—Oct. 1, by City Engineer, 8,115 ft. 24- to 48-in. sewer pipe. Noted Sept. 4.

## CONTRACTS AWARDED

**California** — State Hy. Comn., Sacramento, grading 4.1 mi. Redwood City-Willow Rd., to Basich Bros., Torrance, $83,416.

**Calif., Los Angeles**—Bd. P. Wks., City Hall, grading, storm and sanitary sewers, 6 and 7 in. concrete and compressed concrete paving 1,355,000 sq.ft. Olympic Blvd. and Stanley Ave. Impvt. Dist., to G. H. Oswald, 366 East 58th St., $458,138. Noted Aug. 14.

**Calif., Mill Valley**—W. Falley, city clk., grading, curbing, concrete and asphaltic concrete paving Summit Ave., et al, to McDonald & Maggoria, Sausalito, $89,687.

**Calif., San Rafael**—E. W. Smith, city clk., concrete curbing, guttering, 5 in. hydrated concrete paving 2nd St., to P. F. Harless, San Rafael, $19,135; concrete curbing, guttering, vitr. pipe sewers, 5 in. hydrated concrete paving Mission Ave., to A. G. Raisch, 46 Kearney St., San Francisco, $8,405. Noted Sept. 11.

**Ill., Chicago**—Bd. Local Impvts., City Hall, grading, 8 in. tile sewers, brick manholes, catch basins, concrete paving 1 alley, rock cutting, filling, curbing, guttering, sewers, 8 in. concrete paving Crandon Ave., to J. Dillon & Co., 2953 South Halsted St.—grading, curbing, guttering, sewers, 8 in. concrete paving West 82nd Pl., East 82nd St., South Claremont, South Racine, Central, East End, Ridgeland, Transit and Elliott Aves., to Central Paving Co., 179 Washington St.—Kearsarge Ave., to P. J. O'Brien & Co., 4 North Cicero Ave.—Roscoe and School Sts., North Nottingham and Cornelia Aves., to J. A. Sackley Co., 4608 Belmont Ave.—grading, curbing, guttering, sewers, asphalt on 6 in. concrete paving West 60th St., South La Salle and Normal Aves., to American Asphalt Paving Co., 120 South La Salle St.—Estes and Greenleaf Aves., to Barber Paving Co., 7 South Dearborn St. Noted Aug. 28.

**Ill., Chicago**—Cook Co., County Bldg., paving 4,809 sq.yd. Joliet Ave., to I. D. Lain, Park Ridge, $12,680; 20,876 sq.yd. 1st Ave., to W. A. Black & Co., 165 West Wacker Dr., $39,366.

**Ill., Chicago**—South Park Comrs., 57th St. and Cottage Grove Ave., grading, curbing, sewers, asphaltic concrete on concrete with cinder bed surfacing South Drive of Garfield Blvd. between Princeton and Duncan Aves., to R. F. Conway Co., 33 North La Salle St., $350,000.

**Ill., Edwardsville**—Madison Co., grading, bridge work, concrete paving 8,607 ft. Route 4-B, Sect. 45, M.F.T., to Granite City Paving Co., Granite City. $39,304.

**Ill., Niles Center**—City, concrete paving 74,420 sq.yd. Highlands, Simpson, and Keeler Aves., to Arcole Constr. Co., Evanston, $292,403.

**Ill., River Forest**—Widening, curbing, guttering, rein.-con. paving 6,400 sq.yd. Madison St., to Standard Paving Co., 341 North Parkside Ave., Chicago, $34,483.

**Indiana**—J. J. Brown, dir. State Hy. Comn., Indianapolis, concrete surfacing 1.083 mi. State Rd. 49, Project 180-B, Porter Co., to Sunderson Constr. Co., Gary, $37,262. Est. $53,225. Noted Sept. 4.

**Iowa**—State Hy. Comn., Ames, graveling 6.706 mi. roads in Jones Co., to M. O. Weaver, Iowa Falls, $12,467—grading 0.722 mi. Guthrie Co., to J. H. Miller & Son, Leon, $8,473—0.67 mi. Hardin Co., to Longerbone Bros., Southwest 15th and Market Sts., Des Moines, $10,204—3.695 mi. Jones Co., to Mulgrew & Sons Co., Dubuque, $25,404—2.232 mi. O'Brien Co., to C. W. McNamara, Sioux Falls, S. D., $5,571—12.706 mi. Pottawattamie Co., to J. A. Carlson Constr. Co., Omaha, Neb., $68,333 — grading, flumes, paving 0.734 mi. F. 14 and 0.946 mi. P. 706, Carroll Co., to Union Constr. Co., 200 New York St., Des Moines, $22,091 and $31,968 respectively—0.43 mi. Jackson Co., to Star Coal & Imprt. Co., Davenport, $11,755—culverts in Guthrie Co., to Schaefer & Jakobsen, Lake Park, $2,715—36,140 ft. guard rail in Dist. 2, to H. J. Murphy, Marengo, $6,754—full pressure treated posts for guard rail in Dist. 1, to Wheeler Lumber Bridge & Supply Co., Des Moines, $8,225. Grand total $213,690. Noted Sept. 11.

**Kansas** — State Hy. Dpt., Topeka, **(F.A.P. means Federal Aid Project)**, concrete surfacing 5.516 mi. P. 40-31-F.A.P. 355-I, and 5.132 mi. P. 40-31-F.A.P. 355-J, Shawnee Co., to Koss Constr. Co., 2818 5th Ave., Des Moines, Ia., $112,737 and $105,583 respectively—1.524 mi. P. 40-28-F.A.P. 203-A and P. 40-28-F.A.P. 203-B, Pottawatomie Co., to J. A. Tobin, Kansas City, Mo., $35,757 and $91,637 respectively. Grand total $345,614.

**Kansas**—State Hy. Comn., Topeka, concrete paving 5.516 mi., U. S. Rd. 40, Federal Aid Project 355-I and 5.132 m. same road Sect J, Shawnee Co., to Koss Constr. Co., 2818-5th Ave., Des Moines, Ia. $112,737 and $105,583 respectively—1.524 mi. U. S. Rd. 40, Federal Aid Project 203-A and 3.692 mi. Sect. B, Pottawatomie Co., to J. A. Tobin, 7601 Myrtle St., Kansas City, Mo., $35,757 and $91,637 respectively. Grand total $345,714.

Streets and Roads (Continued)

**Kentucky** — State Hy. Dpt., Frankfort, to Hoke Co., Buechtel, grading, drainage structures 10.271 mi. roads in Adair Co., $84,735—to J. M. Perkins Co., Frankfort, 6.866 mi. Calloway Co., $39,660—grading, drainage structures, surfacing 4.585 mi. Lincoln Co., $66,246; traffic bound limestone surfacing 10.717 mi. Martin Co., $96,462—to T. Ruth & Co., Frankfort, grading, drainage structures, concrete surfacing 9.182 mi. Allen Co., $286,473; grading, drainage structures, rock asphalt on local stone surfacing 12.94 mi. Bath and Montgomery Counties, $381,626—to J. C. Macht, Newport, 11.002 mi. Fleming Co., $353,613—to Wilmore Constr. Co., Wilmore, grading, drainage structures, waterbound macadam surfacing 4.8 mi. Garrard Co., $39,693—to A. Dunn Constr. Co., Corbin, traffic bound limestone surfacing 6.036 mi. Grayson Co., $25,646—to D. L. Walker & Co., Lexington, 20.442 mi. Jackson and Clay Counties, $148,048—to R. H. Waters, Boston, 5.223 mi. Jessamine Co., $23,743—to Corum Bros., Madisonville, 9.616 mi. Union Co., $75,013, bank gravel surfacing 7.998 mi. Muhlenberg Co., $21,840 — to Robinson-Gregory Co. and Hart & Hart, Owensboro, rein.-con. surfacing 11.619 mi. Henderson Co., $193,950—to W. T. Congleton, Lexington, 9.733 mi. Johnson and Floyd Counties, $198,434 — to N. E. Stone & Co., Madisonville, bank gravel surfacing 12.083 mi. Marshall Co., $23,778—to H. H. Miller, Jackson, creek gravel surfacing 12.851 mi. Perry and Knott Counties, $51,639 — to Campbell-Johnson Co., Pikeville, limestone on traffic bound sandstone surfacing 18.599 mi. Perry and Henry Counties, $175,164. Grand total $2,285,764.

**Ky., Louisville**—Dpt. P. Wks., City Hall, paving 5 projects, to Henry Bickel Co., 443 Garden St., $50,000—4 projects to Louisville Asphalt Paving Co., 240 East Lee St., $37,000—3 projects to Andrews-Collings Asphalt Co., Inter-Southern Bldg., $17,000—5 projects, to G. M. Eady Co., Brook and Lee Sts., $26,000—6 projects, to F. G. Breslin, 32nd and Market Sts., $31,000. Grand total $161,000.

**Maryland** — State Roads Comn., Baltimore, graveling 1.36 mi. Contr. AA-93-72, Anne Arundel Co., to DeLuca Contg. Co., Dundalk, $13,810. Noted Aug. 21.

**Maryland** — State Roads Comn., Baltimore, penetration macadam resurfacing 1 mi. Contr. H-93-44, Harford Co., to Harry T. Campbell & Sons, Towson, $17,602. Noted July 31.

**Mass., Boston**—Dpt. P. Wks., J. A. Rourke, comr., bitulithic paving Granfield Ave., to C. Capone, 11 Hemlock St., Roslindale, $33,300.

**Mass., Boston**—Dpt. P. Wks., sheet asphalt paving Massachusetts Ave., Wards 4 and 9, to A. G. Tomasello, 250 Stuart St., $47,860.

**Minnesota**—State Hy. Dpt., St. Paul, grading 4.1 mi. S. P. 3-60-2, and grading, concrete bridge on 1.7 mi. S. P. 3-60-3, to W. W. Magee, Commercial State Bank Bldg., St. Paul, $224,127—grading 4.5 mi. S. P. 15-30, to R. P. Englund, Amboy, $40,851—25.2 mi. S. P. 61-23, to Nolan Bros., 18 North 2nd St., Minneapolis, $215,668. Grand total $480,646. Noted Aug. 28.

**Minn., St. Paul**—Paving South Robert St. between Concord and Tyler Sts., to W. W. Magee, Commercial State Bank Bldg., $69,400.

**Miss., Canton**—Madison Co. Hy. Comn., grading Robinson and Ratliff Ferry Rds., to Nixon & Phillips, Birmingham, Ala., $7,161 and $10,530 respectively—Donohoe Rd., to Allen Bros., Carthage, $18,384 — graveling, to Shuptrine Constr. Co., Emporia, $6,156—Cox Ferry Bridge, to Newsome Bros., Columbus, $3,286. Grand total $45,517. Noted Aug. 28.

**Mo., Clayton**—W. E. Miller, pres. St. Louis Co., Court House, rein.-con. paving Lawler Ave., to Skrainka Constr. Co., Security Bldg., St. Louis, $22,122; grading, drainage structures Essex Ave., to J. Dillon, 2358 Tennessee Ave., St. Louis, $2,625. Noted Sept. 4.

**Mo., Kirkwood**—City, concrete paving 2,225 sq.yd. Woodbine Ave., to Carlon Constr. Co., 3516 Greenwood Blvd., Maplewood, $7,924; 6,788 sq.yd. Rose Hill Ave. and 575 sq.yd. Alley in Block 23, to W. C. Meneely Co., Denny and Conway Rds., R. R. 3, Clayton, $15,895 and $1,415 respectively. Grand total $25,234.

**Mont., Forsyth**—Paving several streets, to J. C. McGuire, Forsyth, $31,821.

**Nebraska**—Dpt. P. Wks., Lincoln, to Yant Constr. Co., 903 Omaha Natl. Bank Bldg., Omaha, graveling 9.4 mi. Franklin Co., $12,679; 8.6 mi. Gage and Johnson Counties, $3,609—to Roberts Constr. Co., Lincoln, 8.9 mi. Box Butte Co., $18,175; 5.2 mi. Grant Co., $8,975; paving 0.5 mi. Merrick Co., $13,034—to P. Sawyer, Holdredge, graveling 5.8 mi. Gosper Co., $7,040—to Murphy Gravel Co., Fremont, 8 mi. Cuming Co., $14,474—to Koehler Constr. Co., Sterling, 3 mi. Cedar Co., $9,023; 8.5 mi. Dixon Co., $25,848—to Plainview Gravel Co., Plainview, 5.5 mi. Knox Co., $7,097; 5 mi. Boyd Co., $5,852; 10.3 mi. Knox Co., $7,441 — to Abel Constr. Co., Lincoln, 17.9 mi. Lancaster and Saunders Counties, $16,763; 14.3 mi. Nuckolls Co., $4,721—to Central Bridge & Constr. Co., Wahoe, 3 mi. Sanders Co., $2,340; concrete culverts Jefferson Co., $2,075—to Camp & Bayley, Gibbon, 3.3 mi. Garden Co., $1,802—to Western Bridge & Constr. Co., 3857 Leavenworth Ave., Omaha, 7.7 mi. Salina Co., $9,079; 9.2 mi. Nemaha Co., $16,290; 8.8 mi. Otoe Co., $3,385; 11.7 mi. Richardson Co., $4,858; bridge, Kimball Co., $6,810—to Interstate Concrete Co., Fairbury, culverts on 6 mi. Webster Co., $23,254; to Beatrice Steel Tank Co., Beatrice, driveway culverts on same project, $237—to Steel & Olinger, Sidney, grading 8 mi. Kimball Co., $16,225—to G. E. Smith, Lincoln, culverts on same project, $11,500 — to Lyle Landreth, Scottsbluff, driveway culverts, same project, $178—to J. L. Deffenbaugh, Lincoln, concrete culverts Gage Co., $536; driveway culverts, same project, 286—to Monarch Eng. Co., Falls City, bridge in Gage Co., $4,294—to Diamond Eng. Co., Grand Island, culverts in Garfield and Loup Counties, $1,544. Grand total $259,424. Noted Aug. 21.

**New Jersey** — State Hy. Dpt., Trenton, improving Route 4, Sect. 3, Hackensack River-Fort Lee Rd., Bergen Co., to Consolidated Production Co., 162 Beach St., Hackensack, $1,647,734; Route S-41, Sect. 4, Cooper Rd.-White Horse Pike, Camden Co., to G. Gentile, Bridgeton, $262,181. Noted Aug. 28.

**N. J., Belvidere**—Bd. Freeholders Warren Co., Court House, 1.25 mi. Alpha-Warren Rd. and Shimers Corner-Straw Church Rd., to New Jersey Asphalt & Paving Co., foot New Jersey Ave., Jersey City, $163,928. Noted Aug. 28.

**N. J., Freehold**—Bd. Freeholders Monmouth Co., Court House, rein.-con. repaving 1¼ mi. Englishtown-Old Bridge Rd., Manalapan Twp., to E. T. McNierney, Bradley Beach, $62,627; 1 mi. Long Branch-Interlaken Rd., to Jannarone Co., Belleville. Noted Sept. 4.

**N. J., Newton**—Bd. Freeholders Sussex Co., Court House, grading, concrete paving Munson Corner State Hy. Rd., Franklin, to Consolidated Production Corp., 162 Beech St., Hackensack, $13,500.

**N. J., Union**—Twp. Comn., Town Hall, curbing, rein.-con. paving Washington Ave., to Decker & Canning Co., Falls Bldg., Union City, $37,955. Noted Sept. 4.

**N. J., Union City**—Bd. City Comrs., City Hall, asphalt on bituminous repaving Bergenline Ave., to Clinton Asphalt Co., 308 16th St., Union City, $77,210. Noted Sept. 18.

**N. Y., Brooklyn**—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to C. D. Pross, West 13th St., $3,278—to Carbloc Paving Co., Stagg St., granite block paving Pacific St., $26,406; asphalt paving St. John's Pl., $55,665—to M. J. O'Hara, Neptune Ave. and West 19th St., Bay 40th St., $5,819; Avenue K, $15,027; Lawrence Ave., $2,965. Grand total $109,160. Noted Sept. 4.

**N. Y., Hamburg** — W. G. Hickman, County Hall, rein.-con. paving McKinley Parkway Extension south, to P. J. Knickenberg, 619 McKinley Parkway, Buffalo, $66,750. Noted Aug. 28.

**N. Y., Long Island City**—G. U. Harvey, pres., Queens Boro, Queens Subway Bldg., to D'Amato Contg. Co., 211 Beach 116th St., Rockaway Beach, grading Beach 29th St., $7,738; to Palmo Constr. Co., 214th St., $5,602; 207th St., $3,954—to P. K. Kelly, 75th St., $391; asphalt paving 81st St., $6,287—to Meehan Paving & Constr. Co., 90 West St., New York, 75th St., $12,453; 69th St., $10,581; Springfield Blvd., $22,998; 88th St., $19,319—to Uvalde Asphalt Paving Co., Metropolitan Ave., Brooklyn, 86th St., $2,989—to A. M. Hazell, Inc., foot 16th St., Brooklyn, repairing Jamaica Bay Blvd., $5,410—to Sprague Contg. Co., Alemeda, Bell Harbor, Cronston Ave., $35,818. Grand total, $133,540. Noted Sept 4.

**N. Y., St. George**—J. A. Lynch, pres. Richmond Boro, Boro Hall, asphalt paving Page Ave., to J. Johnson, 455 Bway., West New Brighton, $20,492; Norwalk Ave., to J. E. Donovan, 2205 Richmond Terrace, Port Richmond, $14,200. Noted Sept. 4.

**O., Akron**—F. E. Swineford, dir. P. Serv., grading 250,000 cu.yd. additional area, Municipal Airport, to C. A. Heyl, East Hopocan Ave., Barberton, $55,000. Est. $75,000.

**O., Akron**—F. E. Swineford, dir. P. Serv., grading, sidewalks, curbing, ornamental lighting system, 3 in. vitr. brick paving 4,750 sq.yd. Hartford Ave. and 7,300 sq.yd. Douglas St., to T. E. McShaffrey Constr. Co., 173 South Forge St., $32,691 and $38,317 respectively. Noted Sept. 4.

**O., Cincinnati**—Granite curbing, cement sidewalks, sheet asphalt repaving 6,500 sq.yd. May St., to Republic Asphalt Paving Co., 847 Wehrman Ave., $30,509. Est. $33,574.

**O., Cleveland**—Cuyahoga Co., grading, vitr. brick paving 32,600 sq.yd. Linndale-Park Rd., to Cleveland Trinidad Paving Co., Western Reserve Bldg., $238,760. Est. $297,600. Noted Aug. 28.

**O., Cleveland**—Cuyahoga Co., 3 in. vitr. brick paving 11,000 sq.yd. St. Clair Ave., Hy. 3, to Floyd B. Stein, Inc., Babbitt Rd., $54,345. Est. $69,600.

**O., Euclid** (br. Cleveland)—Village, 2½ in. brick on 7 in. concrete paving, East 254th St., to Floyd B. Stein, Inc., Babbitt Rd., Cleveland, $17,614; curbing, 5 in. brick paving 3 streets in Idlewild Beach sub-division, Gould & Maybach, 16311 Saranec Rd., Cleveland, $20,060. Noted Sept. 11.

**O., Salem** — City, asphalt paving Woodland Ave., to Kelly-Meyer Constr. Co., South Side Bank Bldg., Youngstown, $25,209. Est. $25,000.

**Ore., Portland**—Common Council, improving Burnside St., to Kern & Kibbie, 290 East Salmon St., $110,990. Est. $101,132.

**Ore., Portland**—Dpt. P. Wks., widening East 7th St., to J. Rebman, Portland, $30,798. Est. $36,100.

**Pennsylvania** — State Hy. Dpt., Harrisburg, grading, concrete surfacing 7,160 sq.yd. roads in Brockway Boro, Snyder Twp., Jefferson Co., to R. N. McNutt, Clarion, $37,593.

**Pennsylvania** — State Hy. Dpt., Harrisburg, grading, concrete surfacing 11,000 sq.yd. in Uniontown, Fayette Co., to Cole Bros. Constr. Co., Morgantown, W. Va., $67,202; 12,477 sq.yd. Blaine St. in McAdoo Boro, Schuylkill Co., to Altoona Constr. Co., Altoona, $47,630. Noted Aug. 7.

**Pa., Derry**—Westmoreland Co., rein.-con. paving 1 mi. road through New Derry, to Thornberg & Whitney, Greensburg, $45,790.

**Pa., Dravosburg**—Grading, curbing, paving Maple and Euclid Aves., to Larsen & Poland, 1813 Sumac St., McKeesport, $33,000.

**Pa., McDonald** — Repaving Barr and Grant Sts., Center and 1st Aves., to R. V. Baldwin, Coraopolis, $38,303.

**Pa., Pittsburgh** — E. G. Lang, City-County Bldg., grading, paving, repaving Perry St., to Minsinger Co., 1201 Vickeroy St., $1,776 — Crosby Ave., to A. F. Jordano, 1201 West Liberty Ave., $3,333—Diamond St. and North Euclid Ave., to M. O'Herron Co., South 1st and McKean Sts., $12,297 and $11,436 respectively—Federal St., to Narduli & Sons, 1315 Washington Blvd., $8,745 — Montour Way, to McDonough & O'Toole, 514 Climax St., $1,995. Grand total $39,582.

**Pa., Pittsburgh**—To D. Pavia, 331 Ladson St., grading, curbing, paving Bruce St., $5,708; Childs St. $11,344; Snowden St., $5,983—to M. O'Herron Co., South 1st and McKean Sts., Essen St. $13,218—to Booth & Flinn Co., 1942 Forbes St., Warren St., $5,734—to A. F. Jordano, 1201 West Liberty Ave., Forest Way, $5,435. Grand total $47,422.

**Pa., Turtle Creek**—Allegheny Co., rein.-con. surfacing 11,267 ft. Turtle Creek-Monroeville Rd., 18 and 30 ft., to Allegheny Contg. Co., Columbia Bank Bldg., Pittsburgh, $123,194.

**Pa., Westmoreland**—Monessen Co., rein.-con. surfacing 7,045 ft. Grand Boulevard Extension, 18 ft., to Gray Bros., Youngstown, O., $77,652.

**Rhode Island** — State Bd. P. Roads, Providence, bituminous macadam paving 3.5 mi. F.A.P. 68-A, North Smithfield, to Arute Bros., Inc., South Main St., New Britain, Conn., $84,332—3.2 mi. F.A.P. 64-A, Foster, and 6 mi. F.A.P. 66-A, Scituate, to Lawton Constr. Co., 250 Gallatin St., Providence, $80,052 and $155,886 respectively. Grand total $320,271. Noted Sept. 4.

**Texas**—G. Gilchrist, state hy. engr., Austin, triple asphalt surfacing 15.425 mi., Throckmorton Co., to J. E. Ward Co., 716 Linz Bldg., Dallas, $52,518 est. $100,000—grading, drainage structures, 19.672 mi. Hansford Co., to Asplund Constr. Co., Box 1614, Amarillo, $24,051 est. $40,000—12.271 mi. Fisher Co., and 19.792 mi. Fisher and Nolan Counties, to Huddleston & Work, Vernon, $48,429 and $144,193 respectively, est. $66,000 and $100,000 respectively—10.471 mi. Upton Co., to Wright Bros. Constr. Co., San Angelo, $34,834 est. $116,000—5.083 mi. Ellis Co., to E. R. Leach, Thornton, $35,863 est. $42,000—13.021 mi. Culberson Co., to Gifford-Hill Co., Inc., North Texas Bldg., Dallas, $53,388 est. $60,000 — 19.197 mi. Refugio Co., to E. G. Powell, Box 688, Jacksonville, $87,540 est. $120,000 — 2.312 mi. Dallas Co., to R. B. Hollefield, 4847 Gurley St., Dallas, $47,933 est. $54,000, all foregoing 26 ft. wide—17.99 mi. Ochiltree Co., 36 ft., to W. B. Le Master, Perryton, $21,758 est. $38,000—grading, drainage structures, grade separation shoulders 0.668 mi. Dallas Co., 26 ft., to J. P. Foty, 411 Burt Bldg., Dallas, $26,949 est. $25,000—grading, drainage structures, triple bituminous surface treating 3.186 mi. Hall Co., to McClung Constr. Co., 1309 Fort Worth Natl. Bank Bldg., Fort Worth, $42,478 est. $56,000—double bituminous surface treating on gravel base course with limestone binder, 8.354 mi. Bowie Co., to Cocke & Braden, Marshall, $66,861 est. $80,000—concrete paving 4.191 mi. Cottle Co., to R. Pleasants, 715 Rule Bldg., Amarillo, $89,351 est. $100,000—3.783 mi. Navarro Co., to F. P. McElwrath, Box 727, Corsicana, $80,499 est. $100,000, all foregoing 18 ft. Grand total $856,645. Noted Sept. 11.

**Tex., Dallas**—C. E. Gross, aud. Dallas Co., paving 5,500 ft. Unit 3, Buckner Blvd., 40 ft., to H. L. Cannaday Constr. Co., 1122 South Lewis St., Tulsa, Okla. $50,000. Noted Aug. 7.

**Virginia**—State Hy. Comn., Charleston, local gravel surfacing 6.3 mi. Route 52, Project S-626-GI, Sussex Co., to C. A. Ragland, Louisburg, N. C., $28,854.

**Washington**—S. J. Humes, dir. State Hys., Olympia, improving 3.281 mi. Skamania Co., to A. L. Douglas & Sons, Stevenson, $9,288; grading 2.878 mi. Chelan Co., to Clifton, Applegate & Toole, Hutton Bldg., Spokane, $39,958. Noted Aug. 21.

**Wash., Seattle**—King Co. constructing 4 mi. Issaquah Rd., Revision 2, to Magnus Espeland, 4415 Colliss Ave., Seattle, $39,734. Noted Aug. 28.

**Wisconsin**—State and Oneida Co. Hy. Comns., Court House, Rhinelander, grading, topsoiling 3,193 cu.yd. Monico-Hiles Junction Rd., to S. J. Groves & Sons Co., 306 Globe Bldg., Minneapolis, Minn., $95,161; constructing Gagen Overhead, to Chicago Constr. Co., Chicago, Ill., $9,078. Noted Sept. 11.

**Ont., Orillia**—James, Proctor & Redfern, engrs., 36 Toronto St., Toronto, alternate types paving Barrie Rd. and Coldwater St., to Hamilton Paving Co., 400 Gage Ave., N., Hamilton, $40,000.

**Ont., Toronto** — City Council, bitulithic on concrete paving Imperial St. and Stibbard Ave., to Warren Bituminous Paving Co., Ltd., 74 University Ave., $12,133 and $18,595 respectively; asphalt on concrete paving Spurgeon Ave., to McNamara Constr. Co. Ltd., 53 Yonge St., $4,918. Grand total $35,646.

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## EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

### PROPOSED WORK

**California**—See "Sports and Parks"

**Calif., Long Beach**—Long Beach Port, R. C. McGlone, mgr., repairing breaks in outer and inner bulkhead, incl. 500,000 cu.yd. earth excav., driving piles.

**Ill., Barnett**—Barnett Special Drainage Dist., 69,360 cu.yd. excav., grading, clearing, grubbing, removing 18 ft. span culvert, replacing same with new concrete abutments, lowering 2 culverts, new culverts, 4 flood gates, 10 wood culverts, near here, to Hardwick Constr. Co., Beardstown.

**Ind., Jeffersonville**—See "Waterworks"

**Kan., Madison** — Draining, straightening Verdigris River, $25,000. Emporia Eng. Co., 101 West 6th St., Emporia, engrs.

**N. Y., New York**—See "Hospitals."

**Pa., Pittsburgh**—See "Contracts Awarded."

### BIDS ASKED

**Ark., Osceola**—Oct. 1, by Bd. Comrs. Sub. Dist. 1 of Dead Timber D.D. 13, at Court House, 57 mi. drainage ditches, incl. 2,289,000 cu.yd. earth excav., 965 ft. timber bridges. O. M. Fairley, Osceola, engr.

**Calif., Merced**—Oct. 7, by H. P. Sargent, secy. Merced Irrigation Dist., shaping, concrete lining 6 mi. existing canals, installing side gates, other structures, incl. 524,000 sq.ft. 2 in. lining.

**Mass., Norfolk**—Sept. 26 (extended date), by Comrs. Correction Dpt., State Prison Colony, excavating 4,000 lin.ft., filling trench for 8 or 10 in. c.i. pipe, State Prison Colony. Noted Sept. 18.

**Miss., West Point**—Oct. 2, by Bd. Comrs. Cane Creek D.D. 2, drainage ditch, 8 ft. deep, 24 ft. wide on top and 20 ft. wide on bottom, incl. 38,000 cu.yd. excav.

### CONTRACTS AWARDED

**Ala. Birmingham**—A. J. Hawkins, city engr., widening, straightening, and deepening Village Creek for drainage purposes, incl. 63,000 cu.yd. earth and 15,800 cu.yd. rock excav. also 137,000 cu.yd. earth and 73,000 cu.yd. rock excav., to Ward Hayes Constr. Co., Mound City, Ill., $85,024 and $165,163 respectively. Noted Aug. 21.

**Calif., Turlock**—Turlock Irrigation Dist., 2 in. canal lining, to Carlson Bros., Turlock, 407,625 sq.ft. at $0.0585 per sq.ft.; to E. Erickson, Turlock, 73,400 sq.ft. $0.059, 140,515 sq.ft. $0.06, 37,760 sq.ft. $0.07; to M. B. Clipper, Turlock, 99,900 sq.ft. $0.0583, 139,200 sq.ft. $0.0569. Noted Aug. 7.

**Conn., Hartford**—City, Bd. Contr. & Supply, preliminary filling for dike, to A. I. Savin Constr. Co. $150,000. Noted July 24.

**Ill., Rock Island**—City, River Terminal for use by Inland Waterways, warehouse, bulk docks, trackage, to Priester Constr. Co., Amer. Bank Bldg., Davenport, Ia., $249,000; escalator machinery, to Link Belt Co., 910 South Michigan Ave., Chicago, $11,368; plumbing and heating, to Kale-McKay Co., Rock Island, $4,979; electrical work, to Electrical Constr. Co. & Mchy. Co., Rock Island, $4,517. Grand total $269,864. Noted Aug. 14.

**Kan., Council Grove**—R. M. Armstrong, city clk., clearing Neosho River, Elm Creek, incl. 494,040 cu.yd. excav., 1,130 ft. 12- to 72-in. Armco or Toncan asphalt dipped pipe, slide gates, extension stem, manholes, rein.-con. wall, bulkheads, rip rap, to Torson Constr. Co., 46th and Gillham Sts., Kansas City, Mo., $70,000. Est. $100,000. Noted Aug. 21.

**Pa., Pittsburgh**—Baltimore & Ohio R.R. Co., Baltimore, Md., H. A. Lane, ch. engr., rail-river dock, ice breakers, mooring pile clusters, incl. 25,000 cu.yd. dredging, pile and timber pier, 300 ft. long, wing walls, to Enterprise Contg. Co., Bessemer Bldg. Bids later land work, incl. concrete bins, hopper bins, conveyor equipment, transfer coal from gondolas to river. Total est. $100,000.

**Tex., Houston** — City, c/o W. E. Monteith, mayor, steel sheet piling wall on both sides of bayou, to Don Hall Constr. Co., Cotton Exch. Bldg., $395,128. Est. $400,000. Noted July 31.

# Public Bond Elections

## *Coming Bond Elections*

**Reservoir**—Augusta, Kan., Sept. 23. $130,000.
**Waterworks**—Clarkton, Mo., $20,000.
**Waterworks Impvts** — Grand Forks, N. D., November, $250,000.
**Wells and Pumping Equipment** — Mangum, Okla., Oct. 14, $108,000.
**Sewage Disposal Plant** — Watertown, S. D., Oct. 7, $225,000.
**Bay Front Impvts.**—Corpus Christi, Tex., Oct. 14, $1,650,000.
**Waterway Impvts.** — Hoquiam, Wash., November, $100,000.
**Hospital Additions**—Fresno, Calif., $250,000.
**County-City Building**—San Diego, Calif., Nov. 4, $1,000,000.
**Court House** — Ellis County, Kan., Nov. 4, $200,000.
**High School** — Hugoton, Kan., Sept. 29, $175,000.

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## *Bonds Voted*

**Waterworks**—Leoti, Kan., C. A. Haskins, Kansas City, Mo., Engr., $35,000.
**Waterworks** — Tribune, Kan., F. E. Devlin, Wichita, Engr., $27,000.
**Waterworks**—Richland, Mo., $15,000.
**Waterworks**—Lebanon, Tenn., $200,000.

## *Bonds Defeated*

**Waterworks Impvts.**—Hobart, Okla., $400,000.
**Waterworks**—Camden, Tenn., $40,000.

## FEDERAL GOVERNMENT

### PROPOSED WORK

**Conn., Hartford**—POST OFFICE—Treas. Dpt. at office Sup. archt., plans by Malmfeldt, Adams & Prentice, 15 Lewis St., 3 story, 200 x 300 ft. post office, Church, Allen and Huntley Sts.

**Fla., Cedar Keys** — REMOVING ROCK LEDGES—U. S. Eng., removing rock ledges.

**Fla., Jacksonville**—FENDERS—Con. Q.M. 2 guide fenders within jetties at Volusia Bar, St. John's River.

**Ind., Fort Wayne**—FEDERAL—Treas. Dpt. at office Sup. Archt., bids about January, 3 story, basement, 150 x 180 ft. federal building, Harrison, Webster, Douglas and Brackenridge Sts. Noted Aug. 14.

**Ind., Kokomo**—POST OFFICE—Treas. Dpt. at office Sup. Archt., soon takes bids post office.

**Ind., Lafayette**—POST OFFICE—Treas. Dpt. at office Sup. Archt., new bids in October, post office. Noted Sept. 4.

**La., Burrwood**—EXCAVATING—U. S. Eng. Office, New Orleans, excavating fresh water storage basin.

**La., New Orleans**—LEVEE REPAIRS—U. S. Eng., 2nd Dist., in Atchafalaya River Levees, Lots 1 and 8 (inclusive).

**Mass., Winthrop**—POST OFFICE—Treas. Dpt. at office Sup. Archt., post office, Metcalf Sq.

**Wis., Ashland** — DREDGING — U. S. Eng., Duluth, Minn. removing 259,000 cu.yd. sandy clay in Ashland Harbor.

### BIDS ASKED

**Calif., San Francisco**—TANK—Oct. 6, by Con. Q. M., Fort Mason, 50,000 gal. steel water tank on 55 ft. trestle, at Fort Miley. Noted Sept. 18.

**D. C., Wash.**—ADMINISTRATION—Oct. 21, by Vet. Bur., Arlington Bldg., administration building, incl. roads, walks, at U. S. Veterans Hospital.

**D. C., Wash.** — AUTOMOBILES, TRUCKS, etc. — Oct. 6, by A. L. Flint, genl. purch. agt. Panama Canal, automobiles, motor trucks, reinforcing steel, pumps, drills, pine, douglas fir lumber, creosoted ties, treated and untreated piles, Schedule 2591.

**D. C., Wash.**—DIESEL OIL—Oct. 7, by A. L. Flint, genl. purch. agt. Panama Canal, diesel oil, Schedule 2592.

**D. C., Wash.**—DORMITORY—Oct. 7, by Dpt. Interior, dormitory group, incl. Buildings 1, 2 and 3, at Howard University. Noted May 29.

**D. C., Wash.**—PORTLAND CEMENT—Oct. 3, by A. L. Flint, genl. purch. agt. Panama Canal, portland cement, sodium nitrate dynamite, electric detonators.

**D. C., Wash.**—STEEL BOLTS—Oct. 4, by A. L. Flint, genl. purch. agt. Panama Canal, steel bolts, locknuts, auger bits, ignition cable, cable terminals, switches, Schedule 2593.

**Ill., Grand Lake**—REVETMENT—Oct. 1, by U. S. Eng., Customhouse, St. Louis, Mo., 6,000 lin.ft. revetment in Mississippi River; adv. E. N.-R. Sept. 25. Noted Sept. 18.

**Me., Portland** — BARRACKS — Sept. 29, by Con. Q. M., barracks at Fort McKinley.

**Me., South Portland** (br. Portland)—PILING —Oct. 20, by Superintendent Lighthouses, Portland, steel sheet piling, inclosed wharves, dredging for lighthouse depot.

**Maryland** — ROAD — Oct. 7, by U. S. Eng., Wilmington, Del., 0.5 mi. concrete road between Chesapeake City and Delaware State Line; adv. E. N.-R. Sept. 25.

**Mass., Pittsfield**—EXTENSION—Oct. 20, by Treas. Dpt. at office Sup. Archt., extending, remodeling U. S. Post Office; adv. E. N.-R. Sept. 25.

**Mich., Battle Creek**—HOSPITAL—Sept. 30, by Treas. Dpt. at office Sup. Archt., 3 story, basement, brick, rein.-con., steel, at Camp Custer.

**N. M., Albuquerque**—EXTENSION—Oct. 29, by Treas. Dpt. at office Sup. Archt., extension, remodeling (except elevators) U. S. Post Office, Court House.

**New York**—RIPRAP JETTY—Oct. 20, by U. S. Eng., Army Bldg., 39 Whitehall St., New York, 8,400 ft. riprap jetty at Rockaway Point, entrance to Jamaica Bay; adv. E. N.-R. Sept. 25.

**N. Y., New York** — VENTILATING ENTRANCES—Oct. 15, by Treas. Dpt., at office Sup. Archt., main and emergency ventilating entrances in 3 story vault, U. S. Assay Office.

**O., Toledo**—ELEVATORS—Oct. 13, by Treas. Dpt. at office Sup. Archt., 2 electric passenger elevator in U. S. Court House.

**Va., Fort Monroe**—APARTMENTS—Oct. 10, by Con. Q.M., three 4 family apartment houses.

**Va., Quantico** — BARRACKS — Spec. 6230 Oct. 15, by Yards & Docks, Navy Dpt., four 3 story barracks, plumbing, sewerage, steam distributing system, electric light and power lines, telephone conduits, concrete and bituminous paving at Marine Barracks; adv. E. N.-R. Sept. 25.

**Va., Quantico**—HANGARS—Spec. 6274—Yards & Docks, Navy Dpt., taking bids dismantling and re-erecting 3 steel hangars; dismantling and storing 1 steel hangar and two 100 ft. radio towers; erecting 60 x 110 ft. extension to existing hangar.

**Wash., Tacoma**—POST OFFICE—Oct. 14, by Treas. Dpt. at office Sup. Archt., remodeling, enlarging U. S. Post Office, Court House, and Custom House.

### CONTRACTS AWARDED

**Idaho**—ROAD—Pub. Rds., Ogden, Utah, grading 7.091 mi. Elk City Natl. Forest Hy., Idaho Co., to W. L. Geist, St. Maries, $89,645. Est. $112,201. Noted Aug. 29 Daily.

**Mass., Northampton**—HOSPITAL—Vet. Bu., dining hall addition, to D. A. Sullivan & Sons, 78 Main St., $47,543. Noted Aug. 8.

**Miss., Pascagoula**—DREDGING—U. S. Eng. Office, Mobile, Ala., dredging 1,500,000 cu.yd. Mississippi Sound Channel, to New Orleans Coal & Bisso Towboat Co., United Fruit Bldg., New Orleans, La., $210,000. Noted July 31.

**N. Y., Fort Hamilton** (sta. Brooklyn) — MONUMENT — Spec. 6205 — Yards & Docks, Navy Dpt., Dover Patrol Monument, Fort Hamilton Park, to J. Young, Jr., 103 Park Ave., New York, $29,760. Noted Aug. 21.

**Tex., Randolph Field**—BARRACKS—Con. Q. M., cadet building group and hospital, detachment barracks, to S. and W. Constr. Co., Shrine Bldg., Memphis, Tenn.) $401,276 and $226,074 respectively. Noted Sept. 11.

**Va., Fort Humphreys** — QUARTERS — Con. Q.M., 35 sets non-commissioned officers quarters, to A. J. Saville, Inc., Richmond, $244,187. Noted July 31.

## RAILWAYS

### PROPOSED WORK

**Idaho**—See "Unclassified" under Wallace.

**Pennsylvania**—Pennsylvania R.R. Co., Broad St. Sta. Phila., T. J. Skillman, ch. engr. Buffalo Division, yard improvements incl. 110 ft. turn table, ash pit extensions, 60 ton structural steel, 6,500 cu.yd. excav., at South Oil City (Oil City, P. O.). $140,000.

**Texas**—Panhandle & Santa Fe Ry. Co., subsidiary Atchison, Topeka & Santa Fe Ry., W. W. Kelly, ch. engr. western lines, Amarillo, improving railroad, incl. 1 mi. trackage in yards extending 25 x 315 ft. timber unloading platform, at Lubbock. $100,000. Will probably build by own forces.

## SUBWAYS AND TUNNELS

### PROPOSED WORK

**New York** — Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, application approved by War Dpt. for twin vehicular tunnels, one 11,110 ft. from 3rd Ave. and 88th St., Brooklyn, to Hylan Blvd., St. John's Ave. and Bay St., Staten Island, and other 12,800 ft. from 82nd St. and 5th Ave., Brooklyn, to same terminal, Staten Island. $80,000,000.

**Ont., Mimico**—Town and Canadian Natl. Ry., T. T. Irving, ch. engr., New Union Sta., Toronto, concrete, structural subway under railway tracks, Burlington St. $150,000.

### BIDS ASKED

**N. Y., New York**—Oct. 3, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., passageway in West 41st St., connecting Queensboro Subway and 8th Ave. Rapid Transit Railroads.

## GRADE CROSSINGS

### PROPOSED WORK

**Calif., Burbank**—Grade separation under tracks Southern Pacific Ry., at Victory Blvd., structure 66,000, paving, curbing, walks $20,000. City of Los Angeles pays $15,000, Los Angeles Co. $19,000, cities of Burbank and Glendale $5,000 each, property owners in vicinity $20,000, and Southern Pacific R.R. Co., 65 Market St., San Francisco, G. W. Boschke, ch. engr., $22,000 of cost.

**Mo., Beverly**—Chicago & Western R.R. Co., W. J. Towne, ch. engr., 400 West Madison St., Chicago, Ill., concrete viaduct over Missiouri State Hy. 45, Platte Co. $31,742; State Hy. Dpt., Jefferson will pay half cost.

**New York**—Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany eliminating Pony Fram, Glen Bridge and Candall Crossings, on Shadyside-Oneonta and West Oneonta and Otego-Oneonta County Hys., West Oneonta and Otego, Otsego Co. $201,780.

### CONTRACTS AWARDED

**Ga., Columbus** — Comrs. Muscogee Co., R. Brown, chn., viaduct over Central of Georgia R.R. and Seaboard Air Line tracks, underpass under another track and concrete culverts, all on Brown St., to H. F. Wildeman, Waycross, $22,069. Noted Apr. 10.

## DAMS

### PROPOSED WORK

**Calif., Pasadena**—See "Waterworks."

### CONTRACTS AWARDED

**Colo., Denver**—Concrete masonry dam, 140 ft. high on south fork South La Platte River, 27 mi. above Lake Cheeseman, 50 mi. west of Colorado Springs, incl. 50,000 cu.yd. concrete, 22,000 cu.yd. rock excav., also outlet, to Gordon Constr. Co., 31st St. and Platte Sts., $469,506.

## PIERS AND WHARVES

### CONTRACTS AWARDED

**Ont., Hamilton**—WHARF—Canadian Industries Ltd., 1050 Beaver Hall Hill, Montreal, Que., creosoted fir wharf, with redwood caps, ties and decking, to S. MacKenzie, 515 Main St. E., $50,000. Noted June 5.

## POWER AND LIGHTING

### BIDS ASKED

**Calif., San Francisco** — Oct. 17, by Bd. Regents University of California, at Berkeley, installing distribution system for electricity, air and steam on San Francisco Campus of University of California.

**New York**—Oct. 3, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing, installing power equipment for portion Independent System City-Owned Rapid Transit Railroads, Manhattan, Brooklyn and Queens Boros.

**New York**—Oct. 24, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing, installing block signaling and interlocking equipment for portion Independent System City-Owned Rapid Transit R.R., Manhattan, Queens and Brooklyn Boros.

**N. Y., New York**—Oct. 10, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., furnishing, installing telephone and emergency alarm equipment, for portion Independent System City-Owned Rapid Transit Railroads, Manhattan Boro.

### CONTRACTS AWARDED

**Md., Chestertown**—State Roads Comn., G. C. Uhl, chn., Baltimore, electrical work necessary for power line, lighting system for bridge over Chester River, to Electromechanical Co., Calvert and Centre Sts., Baltimore, $7,747. Noted Sept. 4.

**Mo., Richmond Heights**—Shaw & Francis, 1010 Olive St., St. Louis, street lighting system, underground wires for Lake Forest Subdivision, at Clayton and Hanley Rds., to Burke Electrical Co., 3963 Forest Park Blvd., St. Louis. Est. $30,000.

## SPORTS AND PARKS

### PROPOSED WORK

**California**—Cities of Burlingame, San Mateo and Hillsborough, waterfront playgrounds, incl. golf course, club house, bathing beach, breakwater, yacht harbor, harbor facilities, $1,500,000.

**Ga., Gainesville** — City, O. A. McDermend, chn. Citizens Com., plan 75 x 125 ft. swimming pool, 40 x 90 ft. bath house, complete chlorinating and filtering system, under supervision of D. S. Dent, city mgr. $25,000.

**Mass., Haverhill** — See "Buildings — Unclassified."

## HEATING AND VENTILATING

### CONTRACTS AWARDED

**Mass., Cambridge**—F. W. Webster Co., 340 Congress St., Boston, heating and plumbing in manufacturing building, Wadsworth and Hayward Sts., to J. S. Cassedy, 133 Austin St.; electrical work, to H. M. Haley Electrical Co., 137 Pearl St., Boston. Est. $25,000. Noted July 31, under "Factories and Mills."

## UNCLASSIFIED

### PROPOSED WORK

**Idaho, Wallace**—TUNNEL—Jack White Mining Co., Wallace, 500 ft. tunnel, reconstructing mill, 4 mi. railroad. $380,000.

**N. Y., Brooklyn**—METAL CHEMICAL TANKS—Kings County Lighting Co., 6740 4th Ave., plans by T. Netz, 50 Church St., New York, metal chemical tanks, 1st Ave. and 55th St. $50,000.

**N. Y., New York**—MONUMENT—City of New York, Memorial Com., c/o J. J. Walker, mayor, or J. J. Sheridan, archt., 503 5th Ave., bids in October, monument, Pelham Park. To exceed $40,000.

**Pa., Erie**—SALES SERVICE and STORAGE—Bender Marine Sales Co., c/o R. B. Way Co., 9th and Peach Sts., soon takes bids concrete, brick, steel service and boat storage building, 20,000 sq.ft. floor space, Dock State St. $50,000.

**Tenn., Knoxville**—COAL TIPPLE—Southern Coal & Coke Co., S. C. Mahan, pres., acquired Black Diamond Coal interest at Coal Creek and plans coal tipple, steel, concrete, and 1.5 mi. railroad.

### BIDS ASKED

**Mass., Boston**—REFRIGERATION—Sept. 29, by Institutions Dpt., Boston, altering and repairing refrigeration plant at Long Island Hospital.

**N. Y., Buffalo**—ROOFING, VENTILATORS, ETC.—Oct. 2, by G. F. Fisk, comr. P. Wks., Municipal Bldg., improving Washington Market, incl. roofing, sheet metal work, skylights, ventilators, W. Rathman, city engr.

**N. Y., Newark**—TUNNELS—Oct. 1, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, constructing and heating work for service connections (tunnels) and additional boiler capacity, at Newark State School.

### CONTRACTS AWARDED

**Ariz., Douglas**—STEEL STACK—Calumet & Arizona Mining Co., steel stack, lined with fire brick, 36 ft. diam. at base, 20½ ft. diam. at top, to Kansas City Structural Steel Co., 21st St. and Metropolitan Ave., Kansas City, Mo., $70,000.

**Mass., Millis**—BROADCASTING STATION—Westinghouse Electric Mfg., East Pittsburgh, Pa., W. C. Evans, supt., in charge, brick, steel radio broadcasting station, to V. E. Squires, 15 Bellingham St., Newton Center.

**N. Y., Middletown**—TUNNEL—Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, tunnel, Middletown State Homeopathic Hospital, to J. J. Turner, Middletown, $33,250; heating work, to Equator Heating Co., Inc., 1644 East New York Ave., Brooklyn, $2,456; electrical work, to C. J. Olson, 317 Bwy., Newburg, $3,763; sanitary work, to Levine Plumbing Co., Inc., 520 East 11th St., New York, $9,494. Noted July 24.

**Pa., Pittsburgh** — GRANITE MARKERS — R. G. Woodside, controller Allegheny Co., granite markers on Ohio River Blvd., to Donatelli Granite Co., 2145 Brighton Rd., $33,221. Noted Aug. 28.

**Pa., Pittsburgh**—LANDSCAPING—Allegheny Co., landscaping Ohio Blvd., to Bardona Nurseries, Allison Park, $87,670. Est. $100,000.

**Texas**—NATURAL GAS PIPE LINE—Texas Gas Utilities Co., Del Rio, constructing 42 mi. 4 in. c.i. screw joint pipe line from Anglin Wells in Zavalla Co. to Crystal City and Carrizzo Springs, incl. installation in towns, trenching, backfilling, laying, to N. A. Saich Co., 710 Builders Exch. Bldg., San Antonio, $100,000.

**Ont., Churchill**—ELEVATOR—Federal Dpt. Railways & Canals, Ottawa, power equipment for 2,500,000 bu. elevator, boiler house equipment, to Babcock-Wilcox and Goldie-McCulloch Ltd., Galt.; generator room equipment, to C. A. Parsons Co., Ltd., Royal Bank Bldg., Toronto, Ont., and Newcastle on Tyne, England. Est. $550,000.

**Ont., Kirkland Lake** — MINING PLANT — Wright Hargreaves Mines Ltd., additions to gold mining plant, incl. improving main head frame, complete new electric crusher unit, increasing air compressor capacity. $150,000. Owner builds. Private plans.

## MATERIALS

### BIDS ASKED

CEMENT—**Merced, Calif.**—Oct. 7, by H. P. Sargent, secy. Merced Irrigation Dist., 4,000 bbl. portland cement which has been added at mills 3 lb. of Celite to each 94 lb. (cement manufactured in California).

LUMBER—**Leon, Ia.**—Oct. 1, at office Auditor Decatur Co., 300,000 ft. Douglas fir lumber, 5,700 lin.ft. red cedar piling, 2,500 lin.ft. treated yellow pine piling.

PINE TIMBERS—**Minneapolis, Minn.**—Oct. 2, by F. S. Gram, city purch. agt., 94,400 bd. ft. pine timbers for Water Dpt. N. W. Elsberg, city engr.

GUARD RAIL, POSTS, etc. — **Mississippi** — Oct. 14, by State Hy. Comn., Jackson, 1 car load cable or mesh guard rail, metal sign posts, bridge hardware.

PIPE, etc.—**Trenton, N. J.**—Oct. 10, by Dpt. Institutions & Agencies, State Office Bldg., 684 lin.ft. 18 and 24 in. c.i. water pipe; 1,600 lin. ft. 18 in. rein.-con. or double strength vitr. tile pipe; 10,500 bbl. cement; 3,000 tons concrete sand; 7,500 tons wash gravel; 27,700 sq.yd. reinforcement; 19,000 lin.ft. ½ x 8 in. joint 10 ft. lengths with sufficient bituminous filler to seal points.

MOTOR GASOLINE—**New York, N. Y.**—Sept. 26, by W. J. Flynn, acting pres., Bronx Boro. Crotona Park, 3rd and Tremont Aves., 54,000 gal. motor gasoline.

LUMBER, etc.—**New York, N. Y.**—Oct. 3, by P. J. Dooling, comr. Purchase, Municipal Bldg., lumber and wood paving blocks to Dpts. Parks-Bronx, Parks-Brooklyn, Parks-Manhattan; Plant & Structures, and Police Dpt.

### CONTRACTS AWARDED

PIPE—**San Francisco, Calif.**—L. S. Leavey, city purch. agt., c.i. pipe, fittings for Muny. Water Dpt. during 1930 and 1931, to Enterprise Fdry. Co., 2902 19th St. at $0.04875 per lb.

STEAM CINDERS — **Brooklyn, N. Y.** — H. Hesterberg, pres. Brooklyn Boro. Boro Hall, 15,000 cu.yd. cinders, to J. Donovan, at $0.84 per cu.yd., total $12,600; 100,000 gal. road oil, to Warner Quinlan Co., 2 Park Ave., New York, at $0.411, total $4,110; 2,000 bbl. portland cement, to Colgan Contg. Co., 26 Court St., $2,375, total $4,750. Grand total $21,460. Noted Aug. 21.

## EQUIPMENT

### PROPOSED WORK

TRACTOR—**Los Angeles, Calif.**—T. Oughton, city purch. agt. purchasing backerfiller tractor, Spec. 2175.

TRACTOR—**Gaylord, Minn.**—Sibley Co. purchasing 1 tractor C. R. Patterson, co. hy. engr.

TRACTORS—**Virginia, Minn.**—City, A. E. Bickford, clk. purchasing 2 or more tractors.

TRUCK and TRACTOR—**Pine City, Minn.**—Pine Co., H. Jorgenson, co. hy. engr., purchasing 1 truck and 1 tractor.

TRUCK and TRACTOR—**Center, N. D.**—B. B. Comgne, aud. Oliver Co., purchasing 1 truck and 1 tractor.

TRACTOR—**Cooperstown, N. D.**—P. A. Melgard, aud., Griggs Co., purchasing 1 tractor.

TRACTOR — **Yankton, S. D.** — Yankton Co purchasing 1 tractor.

### BIDS ASKED

GASOLINE ROLLERS—**Oakland, Calif.**—Oct. 9, by F. C. Merritt, city clk., 2 gasoline rollers for Street Dpt.

GROUT STOPS, PIPES, etc.—**Los Angeles, Calif.**—Bd. Supervs. Los Angeles Co. taking bids 325 sheets galvanized grout stops, 80 grout pipes, 1,430 half grout pipes for Big Tujunga Dam 1.

BRACKET FIXTURES and TRANSFORMERS — **Chicago, Ill.** — Oct. 1, by M. J. Kennedy, comr. Gas & Electricity, City Hall, aluminum bracket fixtures and pole type series transformers for 1,000 C. P. lamps, for Municipal Electric Street Lighting System.

FURNACES—**Chicago, Ill.**—Sept. 30, by City, at office Dpt. P. Wks., City Hall, 2 warm air furnaces complete with accessories at Navy Pier, foot Grand Ave. R. W. Wolfe, comr. P. Wks.

SANDER, etc. — **Springfield, Ill.** — Hummer Plow Wks., in market for 18- to 24-in sander, single oscillating drum, power feed.

POSTS—**Iowa**—Sept. 30, by State Hy. Comn., Ames, 41,000 railroad rail right-of-way posts, R. F. White, hy. engr.

DRILL, etc.—**Detroit, Mich.**—Leland Detroit Mfg. Co., 5945 Martin Ave., in market drill, spindle and tapper.

TRUCK—**Anoka, Minn.**—Oct. 7, by E. A. Carlson, aud, Anoka Co., 3½- to 5-ton truck.

TRUCKS—**Glencoe, Minn.**—Oct. 9, by J. J. Leasman, aud. McLeod Co., 1 or more 4 wheeled drive trucks; 1 tractor, 2 graders. I. C. Christlieb, co. hy. engr.

PATROL UNIT—**Long Prairie, Minn.**—Oct. 7, by L. J. Ramstad, aud. Todd Co., 1 motor power patrol unit.

TRACTOR—**Luverne, Minn.**—Oct. 3, by R. Kuehn, aud. Rock Co., 1 crawler type tractor.

TRUCKS — **Minneapolis, Minn.** — Oct. 1, by F. S. Gram, city purch. agt., 20 trucks for Street Dpt., N. W. Elsberg, city engr.

REGULATOR, etc.—**Woodville, Miss.**—Oct. 7, by Bd. Aldermen, voltage regulator for 180 kva. alternator, 2,300 volts with exciter, 15 kw. 125 volts 275 r.p.m.; 90 kva. alternator exciter 7½ kw. and 47½ kva. alternator exciter 5 kw., 1,400 r.p.m. shunt wound.

EXCAVATOR—**Long Island City, N. Y.**—Sept. 29, by G. U. Harvey, pres. Queens Boro. Queens Subway Bldg., excavator for road and street grading for Bureau Hys.

## FOREIGN

**Argentina, Buenos Aires** — Anglo-Saxon Petroleum Co. (Royal Dutch), St. Hellens Court, London, England, oil refinery.

# Buildings

## RESIDENTIAL

### BIDS ASKED

**Calif., Los Angeles**—See "Contracts Awarded."

**Ga., Macon** — Sept. 25, by W. L. Stoddard, archt., 50 East 41st St., New York, 6 story, basement, rein.-con., steel hotel addition, for Hotel Dempsey, c/o H. M. Block, vice pres. and mgr. $375,000.

**Mass., Malden** (br. Boston)—See "Contracts Awarded."

**N. Y., Brooklyn**—See "Contracts Awarded"

**N. Y., Brooklyn**—Atlantic Nevins Corp., 65 Court St., taking bids on separate contracts 8 story, 80 x 125 ft., brick, steel hotel, stores, Atlantic and 3rd Aves. $500,000. M. Klein, 65 Court St., archts. Noted Sept. 4.

**N. Y., New York**—See "Contracts Awarded."

**N. Y., New York**—Alliance Realty Corp., 115 Bwy., separate contract bids about November 13 story, 70 x 92 ft. apartment, 102 West 85th St. $550,000. C. H. Lench, 101 Park Ave., archt. Noted Apr. 24.

**N. Y., New York**—Central Park 88th Street Corp., L. E. Kleban, pres., 1440 Bway., taking bids on separate contracts 18 story apartments, 275 Central Park W. $1,800,000. E. Roth, 1440 Bway., archt.

**N. Y., New York**—Central Park West-92nd Street Corp., H. Kaufman, pres., 1860 Bway., taking bids on separate contracts 10 story apartments, 320 Central Park West. $1,400,000. E. Roth, 1440 Bway., archts.

**N. Y., New York**—A. Greenbaum, 232 Madison Ave., taking bids on separate contracts 19 story apartment, stores, 23rd St. and 8th Ave. $750,000. E. Roth, 1440 Bway., archts. Noted Mar. 13.

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Residential (Continued)

**N. Y., New York**—Four Hundred Thirty-Five West 57th Street Corp., L. Feldman, pres., 119 West 57th St., bids on general and separate contracts in February, hotel, 435 West 57th St. $1,500,000. Sugarman & Berger, 345 Madison Ave., archts. Noted May 23.

**N. Y., New York**—D. Fuller, c/o Caughey & Evans, archts., 29 West 34th St., bids about Jan. 1, general contract 12 story, 317 East 56th St. $300,000. Noted July 10.

**N. Y., New York**—D. Fuller, c/o Caughey & Evans, archts., 29 West 34th St., bids about Jan. 1, general contract 12 story hotel, apartments, 315 East 56th St. $300,000. Noted June 12.

**O., Cleveland**—M. H. Leeb Co., Union Trust Bldg., taking bids 34 story, brick, steel, Moreland Blvd. $250,000. R. W. Harris, B. F. Keith Bldg., archt.

**Wash., Yakima**—H. Bittman, archt., Securities Bldg., Seattle, bids about Oct. 16, 2 story, tower, 100 x 130 ft., brick hotel, for J. Von Herberg, 1520 1st Ave., Seattle. $500,000.

**Wis., Milwaukee**—See "Contracts Awarded."

**Wis., Milwaukee**—J. Leiser, archt., 105 Wells St., taking bids 6 story, basement, 68 x 110 ft., brick, East Capitol Dr., for Miller & Miller, c/o architects.

### CONTRACTS AWARDED

**Calif., Hollywood**—D. L. Edmons, 8 story, basement rein.-con. to P. Elvad, 6231 Afton Pl., Los Angeles. $250,000.

**Calif., Los Angeles**—P. Elvad, 6231 Afton Pl., 8 story, rein.-con., South Gramercy Pl., day labor. $150,000.

**Calif., Los Angeles**—L. Goldford, 5th and Oxford Sts., 9 story, basement, sub-basement, 63 x 150 ft., rein.-con., stone, tile, marble, iron, 5th St. and Oxford Ave., day labor, under supervision A. I. Ronda, archt., 502 Lissner Bldg. $250,000.

**Calif., Los Angeles**—Sunset Loma Holding Co., Sunset Blvd. and Alta Loma Dr., 13 story, basement, sub-basement, 200 x 300 ft., rein.-con., steel, tile, marble, Sunset Blvd. and Alta Loma Dr., day labor and sub-contracts under supervision A. I. Ronda, archt., 502 Lissner Bldg. $1,225,000.

**Calif., Los Angeles**—E. Schwartz & J. C. Ruman, 9th and Serranno Sts., 9 story, basement, sub-basement, rein.-con., tile, marble, 9th and Serranno Sts., sub-contracts and day labor under supervision A. I. Ronda, archt., 502 Lissner Bldg. $250,000.

**Ky., Louisville**—Biltmore Development Co., 122 West Liberty St., owned by Platoff & Bush, contractors and architects, 122 West Liberty St., 11 story, basement, 50 x 200 ft., brick, steel, rein.-con. addition, also garage facilities for 30 additional cars, Bonny-Castle and Everett Aves. Owner builds. $300,000.

**Mass., Malden** (br. Boston)—Webster Realty Co., 99 Lyme St., 4 story, basement, brick, 75 x 140 ft., plain found., Ferry and Cross Sts., separate contracts. $200,000. O. F. Springall, 50 Park St., archt.

**N. Y., Brooklyn** — Five Hundred Fifty-Nine Ocean Avenue Corp., J. M. Kalt, pres., 26 Court St., 6 story, 93 x 97 ft., apartment, Ocean Ave. and Albermarle Rd., separate contracts. $150,000. W. T. McCarthy, 147 Pierrepont St., archt.

**N. Y., Brooklyn**—Jo-Jo Estates, Inc., M. K. Jerski, pres., 1902 Avenue L, 6 story, 84 x 121 ft., East 19th St. and Avenue M, separate contracts. $175,000. M. N. Weinstein, 93 Court St., archt.

**N. Y., Brooklyn**—M. and H. Kishner, Inc., 240 Dover St., 6 story, 84 x 100 ft. apartments, Humbert St. and Ocean View Ave., separate contracts. $200,000. Seelig & Finkelstein, 153 Pierpont St., archts.

**N. Y., Brooklyn**—Minthron Constr. Co., I. Mintz, pres., 1402 Avenue I, 6 story, 86 x 100 ft. apartments, Benson Ave. and Bay 28th St., separate contracts. $300,000. S. L. Malkind, 93 Court St., archt.

**N. Y., Brooklyn**—Morris Frank Realty Co., 1053 Nostrand Ave., 6 story apartments, Darby St. and Brightwater Court, separate contracts. $190,000. Cohn Bros., 361 Stone Ave., archts.

**N. Y., Brooklyn**—Fungrill Realty Corp., 2339 65th St., 4 story, basement, 90 x 162 ft. apartments, 64th St. and Dahill Rd., separate contracts. $195,000. M. Rothstein, 186 Joralemon St., archts.

**N. Y., Brooklyn**—Rosisde Building Co., 49 Elgin Court, 6 story, 84 x 100 ft. apartments, vicinity of Humbert St. and Ocean View Ave., separate contracts. $200,000. Seelig & Finkelstein, 153 Pierrepont St., archts.

**N. Y., New York** — Green-Chris Corp., M. Natanson, pres., 527 5th Ave., 15 story, 3 Christopher St. and 7 Greenwich St., separate contracts. $850,000. Van Wart & Wein, 347 Madison Ave., archts.

**N. Y., New York**—Haril Constr. Co., W. H. Baumgarten, pres., 6 East 45th St., 19 story, 80 x 80 ft., 227 East 57th St., separate contracts. $500,000. Boak & Paris, 11 West 42nd St., archts.

**N. Y., New York**—Potential Realty Co., G. Conrad, pres., 345 Madison Ave., 115 West 86th St., apartment, separate contracts. $600,000. J. M. Felson, 250 West 57th St., archt. Noted Jan. 9.

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**Wash., Seattle**—University Community Hotel, E. Beckett, chn. Building Com., 15 story, basement, 115 x 125 ft., rein.-con., steel hotel, East 45th St. and Brooklyn Ave., to Walter & Brady, Lloyd Bldg. Est. $500,000.

**Wis., Milwaukee**—E. W. Gollin plans by G. Zagel & Bros., 144 East Wells St., 8 story, 50 x 126 ft., brick, steel, rein.-con., plain found., Wisconsin St. $340,000. Owner builds.

## CLUBS

### PROPOSED WORK

**California**—See "Sports and Parks."

**N. Y., Brooklyn**—Y. W. C. A., 189 Montague St., bids late in November, general contract 4 story club, State and Nevins Sts. $150,000. Voorhees, Gmelin & Walker, 101 Park Ave., New York, archts. Noted June 27.

**N. Y., New York**—National Bureau Y. M. C. A., 347 Madison Ave., bids in January or February, negro branch, 174-184 135th St. A. L. Mackenzie, 5 East 57th St., archt. Noted Aug. 14.

### BIDS ASKED

**Calif., San Francisco**—Bakewell & Brown, and J. Bauer, assoc. archts., 251 Kearny St., taking bids 26 story, rein.-con., steel club annex, Post and Mason Sts., for Olympic Club, Post and Mason, Sts. $2,000,000.

**N. J., Red Bank**—J. C. and G. A. Dilatush, archt., 9 Broad St., bids about Oct. 15, general contract 2 story, basement, brick, steel, Riverfront, for Monmouth Boat Club, A. M. Minton, pres. $150,000. Noted Aug. 7.

**N. J., West Orange**—R. Bottelli, archt., 45 Branford Pl., Newark, taking bids altering and constructing 2 story, basement, 40 x 115 ft. addition, Eagle Rock Ave., for Crestmont Golf Club, Eagle Rock Ave. $150,000. Noted June 26 Daily.

### CONTRACTS AWARDED

**N. J., Hackensack**—W. S. Bessell, archt., 58 West 49th St., New York, general contract altering and constructing 3 story, basement, brick club and auditorium addition, Union St., to A. A. LaFountain, Inc., Beech St., for Women's Club of Hackensack, 359 Union St. Est. $150,000. Noted Sept. 4.

**N. J., Perth Amboy**—E. Wierzbicki, archt., 175 Smith St., general contract 3 story, basement, brick, steel, Elm St., to A. Balewicz, Baker Pl., Perth Amboy, for Fourth Ward Polish Citizens Club. $150,000. Noted Sept. 24.

## HOSPITALS

### PROPOSED WORK

**Calif., Fresno**—Fresno Co., c/o D. M. Barnwell, clk., election $250,000, hospital additions, incl. surgery building, childrens ward, contagious disease ward, Swartz & Ryland, Howell Bldg., Fresno, archts.

**Mass., Southbridge** — Harrington Hospital Corp., C. D. Harrington, pres. and Derby, Barnes & Champney, archts., soon lets contract, 3 Joy St., Boston, 4 story, basement, 45 x 130 ft., brick, stone, steel, plain found., Oakes Ave. $200,000. Noted Aug. 15.

**N. J., Newark**—Newark Memorial Hospital, A. Goetz, pres. Bd. Trustees, 16 12th Ave., sketches by Guilbert & Betelle, 20 Branford Pl., 10 story, basement, brick, steel, plain found., Bank and Newton Sts. $150,000 or more.

**N. Y., Brooklyn**—Harbor Hospital, Cropsey and 23rd Aves., bids in December, general contract, 4 story, hospital addition. $750,000. P. M. Erickson, 885 Flatbush Ave., archt. Noted June 19.

**N. Y., Brooklyn** — Swedish Hospital, Rogers Ave., revised sketches by Crow, Lewis & Wick, 200 5th Ave., New York, general contract hospital addition. $250,000-$500,000. Noted Dec. 12.

**N. Y., New York**—Beth Israel Hospital & Jewish Maternity Hospital, S. Singer, pres., 475 5th Ave., bids in October, general contract hospital dispensary, 17th St. near 2nd Ave. $1,000,000. C. B. Meyers, 31 Union Sq., archt. Noted Jan. 9.

**N. Y., New York**—Bronx Maternity Hospital, 1072 Grand Concourse, bids after Dec. 1, general contract hospital, 1072 Grand Concourse. B. H. Winston, 6 East 46th St., archt. Noted Apr. 24.

**N. Y., New York**—Dpt. Health, 505 Pearl St., bids in November, general contract isolation pavilion, North Brothers Island, $250,000. G. M. McCabe, 96 5th Ave., archt. Noted Mar. 27.

**N. Y., New York**—Gotham Hospital, 17 East 42nd St., bids in February, 9 story hospital, nurses' home, power unit. $3,000,000. G. Atterbury, 139 East 53rd St., archts. Noted Apr. 24.

**N. Y., Rockaway Beach** — Dpt. Hospitals, Municipal Bldg., bids late in October, hospital group, incl. quarters, power house, Beach 149th St. $400,000. B. Bernstein, 1536 39th St., Brooklyn, archt.

**N. Y., New York**—Institute for Crippled & Disabled, W. E. Hope, pres., 245 East 23rd St., sketches by Voorhees, Gmelin & Walker, 101 Park Ave., hospital, bulkhead, 398 1st Ave. and 401 East 23rd St. $300,000.

**N. Y., New York**—St. Vincent's Hospital soon lets general contract hospital, 7th Ave. and 11th Sts. O'Connor, Delaney & Schultz, 162 East 37th St., archts. Noted Mar. 13.

### BIDS ASKED

**N. Y., Brooklyn**—Evangelical Deaconess Hospital, about Oct. 1, general contract hospital, Chauncy St. $175,000. Allmendinger & Schlendorf, 852 Monroe St., archts. Noted June 19.

**N. Y., New York**—HOSPITAL—Dpt. Hospitals, Municipal Bldg., bids about Oct. 1, general contract altering Gouverneur Hospital, 5 story, 617 Water St. $175,000. M. Bernstein, 2 Columbus Circle, archt. Noted Jan. 16.

### CONTRACTS AWARDED

**Ind., Plymouth**—Bd. Trustees Marshall Co., 2 story, basement, brick, steel hospital, to Donaldson & Co., 124 East Washington St. Est. $150,000.

**Mass., Springfield**—City, F. C. Parker, mayor, City Hall, 3 story, basement, 40 x 115 ft., 4 and 5 story, basement, 40 x 190 ft., brick, steel, isolation hospital, plain founds., to E. J. Pinney, Inc., 220 Dwight St., est. $500,000; heating and ventilating to G. H. McLaen, Inc., 77 Dwight St., $52,977; plumbing to Wyckoff & Loyd Co., 55 Emery St., $50,000; electrical work to A. A. Shea, Inc., 23 Besse Pl., $31,583. Noted Aug. 15.

**N. Y., Sonyea**—Dpt. Mental Hygiene, State Office Bldg., Albany, general contract buildings for Craig Colony, to A. Friederich, 710 Lake Ave., Rochester, $122,200; sanitary work, to Bareham & McFarland, 136 Main St., Rochester, $12,316.

**O., Amherst**—Lorain Co. Building Comn., M. H. Weltz, aud., 2 and 3 story, basement, 50 x 320 ft., tuberculosis sanitarium, to T. J. Hume, Lorain, $281,142, est. $425,000. Noted Aug. 7.

**O., Cleveland** — Cleveland Clinic Foundation, G. W. Crile, pres., 2050 East 93rd St., 4 story, basement, 120 x 140 ft., brick, steel, concrete clinic, to Crowell & Little Constr. Co., Hanna Bldg. Est. $400,000. Noted July 25.

## CHURCHES

### PROPOSED WORK

**Calif., San Francisco**—Roman Catholic Archbishop of San Francisco, 1100 Franklin St., plans by H. A. Minton, Bank of Italy Bldg., 4 story convent, 2 story school addition, both concrete, Ashbury St. near Waller St. $150,000.

**Mass., Brockton**—Congregational Israel, D. Goldberg, rabbi, 120 Morse Ave., sketches 2 story, basement, brick synagogue, 192 West Elm St. $150,000. Private plans.

**N. J., Maplewood** (br. South Orange)—Wyoming Community Church, Bids in February, general contract church, 430 Wyoming Ave. H. Upjohn, Grand Central Terminal, New York, archt. Noted May 22.

**N. J., Preakness**—F. W. Wentworth, archt., 140 Market St., Paterson, 1 story, basement, brick, for Preakness Reformed Church. $150,000. Noted Aug. 21.

**N. Y., Brooklyn**—B. Braunheim, 210 Ocean Parkway, bids about December separate contracts, Ridge Blvd. and 93rd St. $175,000. Shampan & Shampan, 188 Montague St., archts.

**N. Y., Brooklyn**—Grace Church, G. Hewlett, secy., 97 Columbia Heights, plans by F. H. Hutton, 101 Park Ave., parish house, rectory, Grace Court and Hicks St. $150,000.

**N. Y., New York**—Community Church, 3-12 Park Ave., church and hotel, 3-12 Park Ave. Corbett, Harrison & McMurray, 130 West 42nd St., archts. **Maturity about January.** Noted Feb. 13.

**Ont., Windsor**—St. Claire's Church, E. G. Doe, pastor, Tecumseh Rd., plans by A. J. Lothian, LaBelle Bldg., rebuilding brick, stone, rein.-con., steel, stone, recently destroyed by fire, Tecumseh Rd. $150,000.

### BIDS ASKED

**Calif., Los Angeles**—H. Hartley, archt., Subway Terminal Bldg., taking bids part 3 and 4 story, rein.-con., incl. 1,800 seating capacity auditorium, gymnasium, hall, Lucille Ave., for Bethany Presbyterian Church, Lucille Ave.

**Conn., Middletown** — Oct. 1, by Methodist Episcopal Church, J. Dodd, chn., 1 story, basement, brick, stone church. $200,000. Woodbury & Stuart, 581 Boylston St., Boston, Mass., archts. Noted Sept. 18.

**Minn., St. Paul**—Park Baptist Church, H. O. Skinner, chn. Building Comn., 621 Lowery Bldg., taking bids general contract rein.-con. stone, Summit Ave. and Pierce St. $150,000. W. L. Alban, 347 Endicott Bldg., archt. C. E. Merrill, 23 East 26th St., New York, consult. archt.

**N. J., Newark**—R. Nordin, archt., 207 Market St., bids about Oct. 15, altering and constructing 2 story, basement 80x100 ft., brick, steel, addition to church and school, Sussex and Roseville Aves. for Roseville Presbyterian Church, Roseville Ave. $150,000. Noted Aug. 21.

**N. Y., Brooklyn**—Church of Our Lady of Refuge, Ocean and Foster Aves., bids about Dec. 1, general contract church. $250,000. McKenna & Irving, 15 Park Row, New York, archts. Noted Dec. 8, 1927.

**N. Y., New York**—G. G. Miller, archt., 545 5th Ave., taking bids separate contracts church and apartment, 317 East 50th St., for First Reformed Episcopal Church, 317 East 50th St. $500,000. Noted June 19.

### CONTRACTS AWARDED

**Mass., Pittsfield**—St. Mark's Roman Catholic Society, c/o W. Donohue, archt., 1200 Main St., foundation for concrete, granite, steel, to M. J. Walsh & Son, Shawmut Ave., Holyoke. Total est. $350,000. Noted July 10.

## SCHOOLS

### PROPOSED WORK

**Calif., Alhambra**—Bd. Educ. sketches by R. C. Farrell, 11 South 2nd St., 2 story, Emery Park School site. $180,000.

**Calif., Santa Barbara**—City School Dist., New Junior High School, McKinley Elementary School, Jefferson Elementary School and kindergarten unit. $1,000,000.

**Calif., Santa Rosa**—Santa Rosa Junior College Dist. plans by W. H. Weeks, 111 Sutter St., San Francisco, Junior College, fireproof, Gothic type. To exceed $150,000.

**Ind., Gary**—Bd. School Comrs. revised plans by W. L. Ittner, Inc., Continental Life Bldg., St. Louis, Mo., (1st unit) Glen Park High School, rein.-con., brick, incl. gymnasium, 46th and Madison Sts. $1,000,000. Noted July 24.

**Ind., Rochester**—Bd. School Comrs., plans by S. Purcell, Rochester, rein.-con., brick school. $150,000.

**Mass., Attleboro** — City, L. A. Fales, supt. Schools, Sanford St., sketches by E. M. Corbett, 49 Purchase St., New Bedford, altering and constructing 2 story, basement, brick addition, Washington St. $160,000. **Noted Jan. 30.**

**Mass., Billerica**—Town, M. A. Buck, chm., soon takes bids 2 story, basement, brick, stone, plain found., Pinehurst Dist. $180,000. P. F. Gilbert, 53 Central St., Lowell, archt. Noted July 10.

**Mass., Lynn** — St. Pius Roman Catholic Church, J. M. Farrell, 198 Maple St., sketches by J. F. Cullen, 162 Newbury St., Boston, 2 story, basement, brick, stone school, Maple St. To exceed $150,000.

**Mass., New Bedford** — City, C. S. Ashley, mayor, altering and constructing addition to Senior High School. $1,500,000. Architect not selected.

**Mass., Pittsfield**—Pittsfield Catholic Diocese, c/o J. W. Donohue, archt., 1200 Main St., Springfield, 2 story, basement, brick, steel, stone high school, Linden St. $350,000.

**Mont., Great Falls** — Ursuline Sisters soon take bids 3 story, basement, 50 x 120 ft., brick, terra cotta, rein.-con. school. $250,000. G. W. Shanley, Great Falls, archt.

**N. J., Clifton** — Bd. Educ., High School, 2 story, basement, brick, steel addition, Highland Sect. $150,000. Architect not selected. **Maturity indefinite.**

**N. J., North Plainfield** (mail Plainfield)—Bd. Educ., 125 Somerset St., sketches by J. N. Pierson & Son, archts., 198 Jefferson St., Perth Amboy, 2 story, basement, brick, steel. $150,000.

**N. Y., New York**—Juilliard Musical Foundation, 120 Claremont Ave., plans by Shreve, Lamb & Harmon, 11 East 44th St., 4 story school, 120 Claremont Ave. $800,000.

**Pa., McKeesport**—Bd. Educ. sketches by C. R. Moffitt, Masonic Temple Bldg., brick, steel, concrete high school. $600,000.

**Pa., Phila.**—Bd. Educ., E. Merchant, secy., 19th and Ludlow Sts., plans by J. Hatharme, 19th and Ludlow Sts., 3 story, basement, 132 x 187 ft., rein.-con., brick, plain found., Mellon and 11th Sts. $400,000.

**R. I., Cranston** (mail Providence)—City, H. Fenner, supt. High School, revised plans by W. R. Walker & Son, 49 Weybosset St., Providence, school, Shaw Ave., $150,000; also school, Gardner St., $160,000, both 2 story, basement, brick, stone, plain founds. Noted Apr. 17.

**R. I., Newport** — City, H. W. Lull, supt. schools, plans by D. Shapiro, Globe Bldg., Fall River, altering and constructing 2 story, basement, brick school addition, Mary St., and constructing addition to school, Elm St., plain founds. $150,000. Noted July 10.

**Tex., Corpus Christi**—Catholic Church, c/o E. V. Ledvina, 804 Antelope St., plans by C. L. Monnot, Perrine Bldg., Oklahoma City, Okla., and soon takes bids Catholic Shrine, incl. 2, 3 story, part basement, brick, stone, steel, rein.-con., terra cotta school, Bishop's home, church proper, plain found. $650,000.

**Tex., Denton**—College of Industrial Arts, c/o H. Fitzgerald, plans by H. C. Knight, Wilson Bldg., Dallas, and takes bids Oct. 11, 3 story, 113 x 145 ft., rein.-con., brick, stone dormitory. $150,000. Noted Sept. 11.

### BIDS ASKED

**Calif., Berkeley**—Oct. 6, by Bd. Regents University of California engineering college, incl. group 1, 2, 3 and 4 story concrete, brick, steel buildings, on campus. $685,000.

**Conn., West Hartford** (br. Hartford)—Oct. 2, by Town, School Bd., 2 story, basement, 190 x 290 ft., brick, steel elementary and junior high school, Park Rd. $500,000. R. F. Barker, 15 Lewis St., Hartford, archt. Noted Sept. 4.

**Conn., Bridgeport** — Junior College of Connecticut, E. E. Carbright, pres., taking bids altering and constructing 2 story, brick college building addition. $150,000. C. W. Walker, Jr., 1115 Main St., archt.

**Del., Greenwood**—Delaware School Found., A. J. Taylor, vice pres., Du Pont Bldg., Wilmington, bids about Oct. 15, general contract 3 story, basement, rein.-con., brick, steel high school addition, plain found. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, N. J., archts. Noted Aug. 15.

**Ill., Wilmette**—Schmidt, Garden & Erickson, 104 South Michigan Ave., Chicago, bids about Oct. 3 or 10, girls dormitory, 2 story, brick, stone on 174 x 214 ft. site, 153 Maple Ave., for National College of Education, 2770 Sheridan Rd., Evanston. $150,000.

**Ind., East Chicago**—Bd. Schools Comrs., bids about Oct. 1, rein.-con., stone school, incl. gymnasium, auditorium. $150,000. K. Norris, 205 Calumet Bldg., archt.

**Ind., Richmond**—Oct. 7, by Bd. School Comrs., 85 x 140 ft., brick, steel, stone school, incl. stage, gymnasium. $150,000. O. Hodge, 110 North 20th St., archt.

**Md., Baltimore**—Oct. 1, by Bd. Awards, 3 story, brick, concrete, stone, steel addition to School 84, Heath and Johnson Sts. $155,000. E. H. Glidden, & H. B. Upjohn, 18 East Lexington St., assoc. archts., H. Massart, 328 North Charles St., engr.

**Mass., Ayer** — Oct. 1, by Bd. Selectmen, 3 story, basement, 65 x 125 ft., brick, stone, high school wing, plain found., Main St. $150,000. Brainard & Taylor, 89 Franklin St., Boston, archts. Noted Sept. 4.

**Mass., North Randolph**—Town, F. Chapin, chm. School Comm., taking bids 2 story, basement, brick, plain found., Old St. $150,000. J. E. Kelley, 38 Chauncey St., Boston, archt. Noted July 31.

**Mass., Waltham**—See "Contracts Awarded."

**N. J., Clifton**—Bd. Educ., High School Bldg., bids about Nov. 1, general contract 2 story, basement, brick, steel, rein.-con., Clifton Ave. $250,000. Lee & Hewitt, 152 Market St., Paterson, archts. Noted July 31.

**N. J., Plainfield**—J. S. Piggott, archt., 42 Walnut St., Newark, bids about Nov. 1, general contract 2 storry, basement, brick, steel, rein.-con. school, Liberty St., for St. Mary's Roman Catholic Church, P. A. Maher, pastor, 516 6th St., $300,000. Noted Sept. 4.

**N. J., Summit**—Bd. Educ., 272 Morris Ave., bids about Oct. 1, 2 story, basement, brick, steel, rein.-con., plain found. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts. Noted Sept. 18.

**O., Cleveland**—Sept. 30, by Franciscan Sisters of Perpetual Adoration, J. A. McFadden, chancellor, Guarantee Title Bldg., 4 story, basement, 40 x 200 ft., brick, steel, concrete convent, East 40th St. and Euclid Ave. $250,000. Warner & Mitchell, Bulkley Bldg., archts. Noted July 31.

**Okla., Oklahoma City**—Sept. 29, by J. G. Stearley, clk., Bd. Educ., William Howard Taft High School, 2 story, basement, rein.-con., brick, plain found. $240,000. Layton, Hicks & Forsythe, Braniff Bldg., archts.

**Pa., Coraopolis**—A. Pyzdrowski, archt., 3410 Fleetwood St., Pittsburgh, taking bids ornamental iron work, plastering, roofing, wiring, painting, tile work, terrazzo work, metal partitions, finishing hardware, slate and marble work, elevator, kitchen equipment for mother house and academy Montour Extension, for Felican Sisters, Coraopolis Heights. Total est. $1,000,000. Noted July 17.

**Pa., Manor**—Sept. 27, by Bd. Educ., S. A. Fitzgerald, secy., Leechburg Rd., Ford City, 2 school buildings, Garretts Run and McGrann Sts. $150,000. Tillman Sheeren Jr., Boarts Bldg., Kittanning, archt.

**Ont., Newmarket**—Sept. 29, by Forsey, Page & Steele, archts., 20 St. Clair Ave. W., Toronto, 3 story, basement, brick, concrete, stone, for Pickering College, Prospect St. $150,000. Noted Sept. 18.

**Ont., Toronto**—Sept. 29, by Sproatt & Ralph, archts., 1162 Bay St., five 3 story students buildings, for Emmanuel College, Queens Park Crescent. $250,000. Noted July 17.

### CONTRACTS AWARDED

**Calif., Long Beach**—Bd. Educ., general contract 2 story, 112 x 208 ft., rein.-con., steel, tile, ornamental iron, auditorium, Polytechnic High School site, to Easton & Nesser, 4822 West Jefferson St., $142,597. Noted June 19.

**Conn., Stratford**—Town, J. W. Wright, mgr., general contract 8 room school, South End, to Wm. J. Shaughnessy, Jr., Inc., 555 Grant St., Bridgeport, $71,900; 4 room addition to Gardner School, to E. and F. Constr. Co., 94 Wells St., Bridgeport, $32,172, both brick, steel, limestone. Noted July 10.

**Mass., Cambridge**—Harvard University, A. L. Lowell, pres., 3 story basement, 2 wings, brick, stone, steel, concrete, irregular sized, biological institution, plain founds., to Hegeman-Harris Co., Inc., 185 Devonshire St. Est. $2,000,000. Noted Sept. 18.

**Mass., Cambridge**—Harvard University, A. L. Lowell, pres., altering and constructing 4 story, basement, brick, granite, limestone, dormitory, Winthrop House addition, plain found., to Sawyer Constr. Co., Park Sq. Bldg., Boston. Est. exceeds $150,000. Noted Sept 11.

**Mass., Medford** (br. Boston) — City, A. J. Harty, chn. Building Com., 2 story, basement, brick, stone, plain found., to Frankini Bros. Co., 30 Mystic Ave., $115,300; heating, ventilating and plumbing, to A. F. Curtin & Sons, 42 High St., Needham, electrical work, to C. L. Devoe, 179 Summer St., Boston, est. $25,000. Noted Sept. 4.

**Mass., South Hadley** — Town, School Com., two 2 story, basement, brick schools, plain founds., 1 at Hadley and Ferry Sts. and other at Granby Rd., to W. K. Traquair, 596 South St., Holyoke. Est. $150,000 or more. Noted Sept. 4.

**Mass., Waltham** — Middlesex College of Medicine & Surgery, H. S. Card, 473 Beacon St., 4 story, basement, brick, stone dormitory, power plant, plain found., South St., to Leo Schlick Eng. Co., 314 Beacon St., Boston, engr., by separate contracts. Private plans.

**Mich., Birmingham**—Cranbrook Found., Lone Pine Rd., 3 story, brick, steel, rein-con. school, Lone Pine Rd., to Chas. R. Wermuth & Sons, Maccabees Bldg., Detroit. Est. $300,000.

**N. J., Union City**—F. J. Ricker, archt., 685 Hudson St., West New York, general contract 3 story, basement, 70 x 150 ft., brick, steel high school addition, plain found., to J. R. Alfieri Eng. Co., Inc., 16 Depot Sq., Englewood, for Holy Family Roman Catholic Church, J. N. Grief, pastor. Est. $150,000. Contractor requests bids on all sub-contracts. Noted Sept. 18.

**N. Y., Rochester**—Bd. Educ., Jefferson Junior High School addition, to F. Gleason Co., 16 West Main St., $376,300; plumbing, to E. C. Snyder Co., 86 Scio St., $40,000; heating and ventilating, to F. W. Murtaugh Co., 16 Howell St., $53,788; cut stone, to G. Ittenbach Co., Rochester, $29,233. Grand total $499,321.

**O., Kent**—Kent State Normal College, remodeling brick, steel, administration building, to Indiana Eng. & Constr. Co., Akron. $109,000.

## THEATRES

### PROPOSED WORK

**Calif., Westwood**—Janss Investment Co., c/o P. P. Lewis, archt., 10631 Westwood Blvd., Los Angeles, Class A rein.-con. theatre, 2,000 seating capacity. $250,000.

**Mass., Cambridge** — O'Leary's Inman Sq. Theatre, c/o J. Shapiro, 27 School St., Boston, plans by R. C. Sturgis, 120 Boylston St., Boston, rebuilding 2 story, basement, ell, brick, steel, plain found., recently destroyed by fire, Inman Sq. $150,000.

**Mass., Lawrence** — Salem Realty Co., 126 Washington St., Salem, revised plans by Rapp & Rapp, 1501 Bway., New York, 2 story, basement, irregular sized, brick, stone, granite, steel theatre, stores, offices, Essex and Amesbury Sts. $1,000,000. Noted Jan. 16.

### BIDS ASKED

**Conn., Torrington**—Oct. 3, by Warner Bros., 321 West 44th St., New York, theatre, Main St., T. W. Lamb, 644 8th Ave., New York, archt., Weinberger & Weishoff, 247 Park Ave., New York, engrs.

**N. Y., New York**—Seven Hundred Fifty-Five 7th Avenue Corp., 755 7th Ave., bids about Nov. 1, general contract theatre, 50th St. and 7th Ave. $1,000,000. G. Keister, 56 West 45th St., archts. Earl Carroll, 577 7th Ave., lessee. Noted July 10.

### CONTRACTS AWARDED

**Calif., Merced**—Golden State Theatres, Inc., 988 Market St., San Francisco, 2 story, steel rein.-con., incl. offices, to G. P. Pasqualetti, 2330 Larkin St., San Francisco. $200,000. Noted Dec. 19.

**O., Steubenville** — Paramount Publix Corp., Paramount Bldg., New York, brick, steel moving picture building, offices, to Kaiser-Ducett Co., Joliet, Ill., $300,000.

## BANKS

### BIDS ASKED

**Okla., Oklahoma City**—Weary & Alford, archts., 1923 Calumet Ave., Chicago, Ill., bids Nov. 15, superstructure 30 story, sub-basement, 140 x 200 ft. bank, office, for 1st Natl. Bank & Trust Co., H. M. Johnson, pres. $3,000,000. Foundation contract awarded to Manhattan Constr. Co., 1800 Classen St. Noted July 24.

### CONTRACTS AWARDED

**Conn., South Norwalk** — City Natl. Bank, brick, stone, steel addition, to T. J. Purdy Constr. Co., 1481 Seaview Ave., Bridgeport. Est. $150,000.

**Mass., Lowell**—Appleton Natl. Bank, 174 Central St., altering and constructing 1 and 2 story, basement, brick, stone, concrete, steel, addition, plain found., to R. E. Runels Constr. Co., Hildreth Bldg., est. $150,000. Noted July 11.

**Vt., Burlington** — Chittendon County Trust Co., E. J. Booth, pres., 114 Church St., 2 story, basement, brick, marble, concrete, steel, plain found., to J. E. Cashman, 77 College St. Est. $200,000. Noted Sept. 11.

## OFFICES

### PROPOSED WORK

**Calif., Los Angeles**—State Mutual Building & Loan Assn., 5th St., plans by W. Richards, 606 Architects Bldg., 3 story, basement, 45 x 125 ft., concrete, steel, 5th St.

**Calif., Los Angeles** — Serrano Corp., c/o Morgan, Walls & Clements, archts., Van Nuys Bldg., 12 story, basement, Class A rein.-con., incl. stores, Wilshire Blvd. $500,000.

**Calif., San Francisco**—Mills Estate, Inc., Mills Bldg., plans by L. P. Hobart, Crocker Bldg., 22 story, basement, rein.-con., steel, Bush St. near Sansome St. $2,000,000.

**Conn., Greenwich**—Medical Centre soon lets contract brick, stone professional office, $150,000. C. W. Riley, 101 Park Ave., New York, archt.

**Mass., Everett**—Owner, c/o Lockwood, Greene & Co., archts. and engrs., 24 Federal St., Boston, office, Chemical Lane. $150,000.

**N. Y., New York**—C. R. Lee, 410 Riverside Dr., bids late in October, general and separate contracts 4 story office, storage, loft, 250 West 84th St. $150,000. Sugarman & Berger, 345 Madison Ave., archts. Noted July 2.

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Offices (Continued)

**N. Y., New York**—Two West 55th Street Corp., J. Mayer, pres., 261 West 43rd St., 20 story office, 2 West 55th St. $750,000. Project abandoned. L. and J. Scacchetti, 1775 Bway., archts. Noted Apr. 24.

**BIDS ASKED**

**N. Y., New York**—One Hundred Twenty-Two Water Street Corp., L. Adler, pres., 550 7th Ave., bids about Mar. 1, general and separate contracts 65 story, 141 x 193 ft. office, stores, Wall, Pine, Pearl and Water Sts. $10,000,000. E. J. Kahn, 550 7th Ave., archt. Noted Sept. 11.

**N. Y., New York**—Tishman Realty Co., 285 Madison Ave., taking bids on separate contracts 19 story, 50 x 100 ft., brick, steel, rein.-con. office, stores, 691 Lexington Ave. $400,000. E. J. Kahn, 2 Park Ave., archt. Noted Sept. 18.

**Okla., Oklahoma City**—See "Banks."

**CONTRACTS AWARDED**

**Calif., Inglewood**—Los Angeles Gas & Electric Co., 810 South Flower St., Los Angeles, 2 story, basement, 65 x 90 ft., concrete brick, terra cotta, plate glass, marble, tile, steel. Commercial St. $150,000. Owner builds. Private plans. Noted Sept. 11.

**N. J., North Caldwell** (mail Caldwell) — PENITENTIARY——Bd. Freeholders Essex Co., Hall of Records, Newark, general conteract 3 story, basement, brick, steel, to Auf Der Heide Contg. Co., 443 16th St., West New York, $204,100; plumbing, to Jaehnig & Peoples, Inc., 221 13th Ave., Newark, $12,919; heating, to Burns, Lane & Richardson Co., 1107 Broad St., Newark, $35,500; electrical work, to Bippert-Hunkels, Inc., 42 Lafayette St., Newark, $13,167. Grand total $265,686. Noted Sept. 18.

**N. M., Sante Fe**—Green Loan Co., brick, stone, to Underhill Constr. Co., 810 Eakle Bldg., Amarillo, Tex. Est. $225,000. Taking bids on plumbing, heating, electrical wiring, ventilating.

**N. Y., New York**—Platt Holding Corp., J. Kavacs, pres., 17 East 42nd St., 35-story office, to Shroder & Koppel, 420 Lexington Ave. Est. $3,000,000. Noted July 3.

**N. Y., New York**—Richard Hudnut, 113 West 18th St., New York, general contract office, showroom, stores, 113 West 18th St., to H. M. Hughes, 30 East 42nd St. Est. $150,000. Noted Apr. 24.

**N. Y., New York**—O. Strack (owner and archt.), 222 East 23rd St., 9 and 10 story office, showrooms, to H. D. Hynds, 959 8th Ave. Est. $200,000. Noted Mar. 26.

**N. Y., New York**—Shroder & Koppel, contractors, 420 Lexington Ave., awarded subcontract for structural steel for office, bank, 101 Wall St. and 112 Front St., for Financial Dist. Realty Co., E. Cohen, pres., 206 Bway., to Post & McCord, 101 Park Ave. Noted Aug. 7 under "Contracts Awarded."

**N. Y., New York**—J. Wilson, 140 East 54th St. Corp., L. A. Coffin, pres., doctors' professional building, to Geo. A. Fuller Constr. Co., 597 Madison Ave. Est. $350,000. Noted Mar. 13.

## STORES

**PROPOSED WORK**

**Calif., Los Angeles**—See "Offices."

**Mass., Haverhill**—M. and J. Bloomfield, c/o C. Badger, archt., 50 Merrimac St., 5 story, basement, 100 x 115 ft., brick store, incl. offices, ballroom and indoor golf course, plain found., Merrimac St. $150,000 or more.

**N. Y., New York** — New York Deaconess Assn. of Methodist Episcopal Church, 1175 Madison Ave., plans by Pennington & Lewis, 250 Park Ave., stores, apartments, 1175 Madison Ave. $500,000.

**Wash., Seattle**—W. L. Rhodes Co., plans by V. W. Voorhees, Lloyd Bldg., store on 120 x 100 ft. site, 4th and Pine Sts.

**BIDS ASKED**

**Ind., Ft. Wayne**—Oct. 1, by Boston Store, 604 Calhoun St., 3 story, basement, 75 x 150 ft., brick steel, terra cotta furniture store, Grant and Calhoun Sts. $150,000. A. M. Strauss 415 Cal-Wayne Bldg., archt.

**N. J., Lyndhurst**—P. J. Jossier, archt., 40 Broad Ave., Palisades Park, bids about Nov. 1, general or separate contracts 2 story, basement, brick, steel stores, apartments, for Owner, c/o architect. $150,000. Noted Sept. 4.

**CONTRACTS AWARDED**

**Ind., Aurora**—W. H. Schwier, Jr., 2 story, basement, 50 x 100 ft., rein.-con., brick, 2nd and Main Sts., to Stein Kamp Constr. Co., Batesville. Est. $150,000.

**N. Y., New York**—Carpenter Madison Corp., 551 5th Ave., 40 story store, office, apartment hotel, to Dwight P. Robinson Co., 125 East 46th St. Est. $2,000,000. Noted June 19. Contractor taking bids on separate contracts.

## LOFTS

**PROPOSED WORK**

**N. Y., New York**—Clemons Realty Co., 570 7th Ave., bids after Dec. 1, general contract loft, store, factory, 211 West 29th St. $300,000. J. H. Knubel, 570 7th Ave., archt. Noted Apr. 3.

**CONTRACTS AWARDED**

**N. Y., New York**—New York Telegram, c/o Rhinelander Real Estate Co., 31 Nassau St., general contract 6 story (ultimately 10 story), loft, incl. printing, publishing plant, office, to Adelson Constr. & Eng. Corp., 565 5th Ave., $800,000. Noted July 10.

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## PUBLIC

**PROPOSED WORK**

**Ark., Benton**—HOSPITAL—State, Little Rock, plans by Mann, Wanger & King, Donaghey Bldg., Little Rock, hospital for insane, incl. 4 dormitories, dining hall, kitchen, store, recreation building, garages, dairy house, 3 barns, stables, poultry houses, green house, central power and heating plants, all fireproof, brick, concrete, $3,000,000.

**Conn., Simsbury** — TOWN HALL — Town, Town Clerk, plans by Smith & Bassette, 36 Pearl St., Hartford, 2 story, basement, 160 x 200 ft., brick memorial town hall. Est. exceeds $150,000. Noted Jan. 30.

**Ind., East Chicago**—LIBRARY—City bids about Oct. 1, 2 story, basement, brick, stone, steel, hollow tile. $150,000. K. Norris, 205 Calumet Bldg., archt.

**N. J., Glen Ridge**—MUNICIPAL—Bd. Boro Council, Boro Hall, plans by W. O. Bartlett, 24 Commerce St., Newark, 2 story, basement, brick, steel, Bloomfield and Ridgewood Aves. $175,000. Noted Sept. 11.

**N. J., Newark**—JAIL—Bd. Freeholders Essex Co., Hall of Records Bldg., brick, steel, Newark St. $150,000 or more. Architect not selected.

**N. Y., New York** — LABORATORY — Dpt. Health, Municipal Bldg., bids in January, biological laboratory. $500,000. Sibley & Fetherstone, 205 East 42nd St., New York, archts. Noted May 8.

**N. Y., New York**—OFFICE—Dpt. Sanitation, Municipal Bldg., bids early in October for foundation and bids about December, general contract 10 story, 175 x 202 ft., Worth, Leonard and Lafayette Sts. To exceed $5,000,000. C. B. Meyers, 31 Union Sq., archt. Noted May 1.

**Tex., Dumas**—COURT HOUSE—Moore Co., c/o F. S. Makeig, judge, soon takes bids 3 story, basement, brick, stone, rein.-con., steel, concrete found. $150,000. Berry & Hatch, 414 Oliver Eakles Bldg., Amarillo, archts. Noted July 31.

**Ontario**—BUILDINGS—Dpt. P. Wks., Parliament Bldg., Toronto, expending $19,529,500 improvements, repairs and additions in connection with Provincial institutions, incl. new mental hospital in Northern Ontario, $3,350,000; 2 new vocational schools, $6,300,000; new tubercular sanitarium $525,000; additions to Ontario Hospitals at Orillia and Woodstock, $830,000 and $400,000 respectively; institution for criminally insane, $300,000; replacement of industrial school at Mimico, $1,065,000; refuge at Toronto, $577,500; industrial school at New Toronto, $770,000; nurses building at Ontario Hospital, Brockville, $147,000; cottages at Boy's Training School, Bowmanille, $105,000; rebuilding Ontario Hospital, London, $4,590,000; hospital and school for handicapped children, $570,000. F. R. Heakes, Parliament Bldge., Toronto, archt.

**BIDS ASKED**

**La., Algiers**—ALMS HOUSE—Oct. 7, by City, c/o City Clerk, Touro Shakespeare Alms House, 2 and 3 story, basement, 197 x 204 ft., brick, steel sash, terrazzo, concrete, stucco, rein.-con. found., Manson tract. $200,000. W. R. Burk, Balter Bldg., New Orleans, archt.

**N. Y., New York**—PRISON—Oct. 20, at office Dpt. Correction, R. C. Patterson, Jr., comr., Municipal Bldg., general construction, power plant, for Rikers Island Penitentiary, East River. Sloan & Robertson, 420 Lexington Ave., archts. Noted Mar. 27.

**CONTRACTS AWARDED**

**N. J., Hillsdale**—DORMITORIES—Dpt. Institutions & Agencies, State Office Bldg., Trenton, general contract four 2 story, basement, brick, steel, Hillsdale State Hospital, to A. A. La Fountain, Beech St., Hackensack, $488,700. Noted Sept. 4.

**N. J., Trenton**—OFFICE—Dpt. Institutions & Agencies, State Office Bldg., Trenton, general contract two 4 story, basement wings, for state office building, to General Contg. Co., 133 East Front St., $247,726; plumbing and heating, to Trenton Plumbing & Heating Co., 366 South Broad St., $3,148. Noted July 31.

## BUILDINGS—UNCLASSIFIED

**PROPOSED WORK**

**Calif., San Francisco**—EXCHANGE—Pacific Telephone & Telegraph Co., Telephone Bldg., sketches Class A steel frame, 19th Ave. near K St. $500,000.

**Mass., Boston**—HOME—Florence Crittenton League of Compassion, Inc., 88 Tremont St., revised plans by Mowll & Rand, 21 School St., 2 and 3 story, basement, brick, stone maternity home, hospital, plain found., 10 Pertshire Rd., Brighton, $150,000 or more. Noted Dec. 19.

**Mass., Haverhill**—BUSINESS—M. Bloomfield, c/o C. Badger, 50 Merrimac St., 5 story, 100 x 114 ft., brick, timber, business, office building, incl. golf course, ball room, Merrimac St. $125,000-$150,000.

**Mass., Holyoke**—EXCHANGE—New England Telegraph & Telephone Co., 245 State St., Boston, plans by Densmore, LeClear & Robbins, Park Sq. Bldg., Boston, and soon takes bids 3 story, basement, 85 x 90 ft., brick, steel. $150,000. Noted Nov. 14.

**N. Y., New York**—COMMERCIAL—New York Amphitheatre Corp., c/o N. J. Edelman, 350 Madison Ave., commercial development. $30,000,000. Project abandoned. R. I. Dodge, 70 East 45th St., archt. Noted Apr. 3.

**N. Y., New York** — HOME — Volunteers of America, 34 West 28th St., postponed taking bids until December, 15 story, brick, steel home, A. Martin, 34 West 28th St., archt. Noted Mar. 20.

**N. Y., New York**—EXCHANGE—New York Telephone Co., 140 West St., bids in November, general contract 17 story, 42 Pearl St. Voorhees, Gmelin & Walker, 101 Park Ave., archts. Noted July 3.

**N. Y., New York**—FREIGHT TERMINAL—Port of New York Authority, 75 West St., 14 story, 200 x 800 ft., rein.-con., brick, 8th and 9th Aves., 13th to 15th Sts. **Maturity about Jan. 1.** $9,000,000. Abbott, Merkt & Co., 175 5th Ave., archts. Noted June 19.

**N. Y., New York**—HOME—Seamans Christian Assn. and Y. M. C. A., 420 Lexington Ave., bids early in October, general contract seamen's home, 11th Ave. and 20th St. $1,000,000. Shreve, Lamb & Harmon, 7 East 44th St., archts. Noted Apr. 3.

**N. Y., New York**—RESTAURANT and KITCHEN—H. Seagel, 127 East 24th St., Brooklyn, bids late in October, restaurant, kitchens, etc. 611 West 181st St. $150,000. L. A. Abramson, 46 West 46th St., archt. Noted Sept. 11.

**O., Columbus**—UNION STATION—Graham, Anderson, Probst & White, Railway Exch. Bldg., Chicago, Ill., archts., soon lets contract altering steel, marble, tile, terra cotta union station, for Columbus Union Terminal Co. To exceed $150,000.

**BIDS ASKED**

**Calif., Los Angeles**—PUBLISHING PLANT—F. D. Rutherford, archt., Mills-Fraser Bldg., Santa Monica, taking bids rein.-con. plant, Wilcox Ave., for California Newspaper Assn., 510 South Spring St. $175,000.

**Mass., Quincy**—BUSINESS—R. A. Grossman, 43 Hancock St., taking bids 4 story, 100 x 150 ft., brick, Clivedon and New Sts. $150,000. Private plans.

**CONTRACTS AWARDED**

**Calif., Oakland**—HOME—Salem Benevolent Assn., East 29th St., 2 story rein.-con., East 29th St., to F. J. Westlund, 354 Hobart St., $155,000.

**N. J., Fort Lee**—ADMINISTRATION—Consolidated Film Industries, Inc., Lemoine Ave., general contract 2 story, basement, 70 x 120 ft., brick, steel, combined title building, and 60 x 120 ft. administration building, to R. J. Walsh Co., Inc., 420 Lexington Ave., New York. Est. $150,000. Noted Aug. 7.

**N. Y., Brooklyn**—EXCHANGE—New York Telephone Co., 140 West St., New York, general contract altering exchange, to W. Kennedy Constr. Co., 215 Montague St. Est. $265,000. Contractor taking separate contract bids. Noted May 8.

**R. I., Providence**—ASYLUM—St. Vincent de Paul Infant Asylum, W. A. Hickey, pastor, Fenner St., 3 story, basement, brick, stone receiving wing, to O. & S. Lavigne Co., 10 Weybosset St., est $150,000; heating, to F. Dupuis, 599 Main St.; plumbing, to R. Renaud, 56 Cumberland St., Woonsocket electrical work, to Bitler & Perry, 7 Pleasant St., Pawtucket, est. $25,000. Noted July 31.

# Buildings

## FACTORIES AND MILLS

**PROPOSED WORK**

**Calif., San Francisco** — OIL STORAGE and DISTRIBUTING PLANT — General Petroleum Corp. of California, 310 Sansome St., oil storage and distributing plant in North Beach Dist. $4,000,000. Private plans. This corrects report in Sept. 11 issue.

**Colorado**—PAPER MILL—International Paper Co., 220 East 42nd St., New York, preliminary surveys paper pulp mill at either Pueblo, Salida or Alamosa. $2,500,000-$5,000,000.

**Ind., Huntington** — PLANT — Cloverleaf Creameries, Inc., brick, steel additions. $50,000. Private plans.

**Mass., Cambridge** — CLEANSING PLANT — Owner, c/o W. Galvin, archt., 34 Brattle St., sketches 1 story, basement, 60 x 100 ft., brick. **Massachusetts Ave., opposite Ellery St. $40,000.**

**N. J., Newark**—FACTORY—P. A. Singer & Bros., 113 New Jersey R.R. Ave., plans by M. A. Wolf, archt., 845 Broad St., 1 story, basement, 40 x 110 ft., brick steel addition, 170 Delancy St. $40,000.

**N. J., Newark**—FACTORY—R. C. Klemn, archt., 944 Broad St., soon lets general contract 1 story, basement, 25 x 100 ft., brick, steel, incl. garage, 1820-22 Oxford St., for A. Kaminski, c/o architect. $40,000. Noted Sept. 18.

**N. J., Ridgefield**—FILTER PLANT—Lowe Paper Co., River Rd., revised plans by F. L. Smith, engr. and archt., 21 East 40th St., New York, 1 story, basement, 45 x 115 ft., brick, steel, concrete, plain found., $40,000. Former bids rejected. Noted Sept 17 Daily.

Buildings—Factories and Mills (Continued)

**N. Y., Brooklyn**—FACTORY—D. Cuozzo, c/o F. Savignano, archts., 6005 14th Ave., 100 x 100 ft. factory, Gravesend Ave. and Avenue J. $40,000.

**O., Cleveland**—MILL—Otis Steel Co., C. C. Wales, constr. engr., 3341 Jennings Rd., 1 story, steel, corrugated iron continuous mill building, 3341 Jennings Rd. $400,000. Private plans.

**Wash., Bellingham**—PAPER MILL—Pacific Coast Paper Mills, enlarging mill, to increase capacity to 60 carloads daily. $500,000.

**Wash., Olympia** — COLD STORAGE — Port Comn plans by O. Murray, port engr. and J. Wohleb (1st unit) rein.-con cold storage plant, 5,000 bbl. capacity. $100,000. Total $500,000.

**Ont., Fort William** — GAS PLANT — Fort William Gas Co., subsidiary Canadian Terminal Systems, Ltd., 1106 C. P. R. Bldg., Toronto, gas and coking plant, incl. 6 main buildings, low temperature carbonization process plant, $400,000. H. Addison Johnston, c/o owner, engr. Noted Feb. 28, 1928, under "Industrial Works."

BIDS ASKED

**Conn., Waterbury** — FACTORY — Waterbury Buckle Co., 872 South Main St., C. M. Webb, taking bids 4 story, 70 x 112 ft., brick, South Main St. $100,000. J. De Lauritis, 94 Benedict St., archt.

**Ind., Terre Haute**—FACTORY—See "Contracts Awarded."

**Me., Peru** — FACTORY — See "Contracts Awarded."

**Mass., Salem** — LAUNDRY — Salem Laundry Co., 51 Lafayette St., taking bids 2 story, 115 x 160 ft., brick, steel top addition, plain found., Derby St. $40,000 or more. Densmore, Le Clear & Robbins, Park Sq. Bldg., Boston, archts.

**N. J., Bound Brook**—FACTORY—J. N. Pierson & Son, archts., 198 Jefferson St., Perth Amboy, taking bids separate contracts 1 story, basement, brick, steel, for Pathe Exchange, Inc., Middlesex Boro. $40,000. Noted Sept. 19.

**N. J., Paterson**—FACTORY—Lee & Hewitt, archts., 152 Market St., bids about Oct. 15, general contract 2 story, basement, 65 x 165 ft., brick, steel, for J. S. Royal, c/o architect. Noted Sept. 11.

CONTRACTS AWARDED

**Calif., Long Beach**—SOAP MANUFACTURING PLANT—Proctor & Gamble, six 2 to 6 story, concrete, steel, rein.-con. buildings, to Clinton Constr. Co., Spring-Arcade Bldg., Los Angeles, exceeds $750,000.

**Ind., Ft. Wayne**—FACTORY—General Electric Co., E. A. Barnes supt., general contract 50 x 80 ft. brick, steel, incl. 50 ft. brick chimney, to Buesching & Hagerman Co., 402 Superior St. Est. $43,000. Noted Aug. 21.

**Ind., Hammond**—FACTORY—Hammond Lead Products Co., general contract rein.-con., brick 1200 Standard Ave., to F. C. Rowley, 611 Hohman St.; steel contract, to Truscon Steel Co., North Wells St., Chicago, Ill. Est. $100,000.

**Ind., Terre Haute**—FACTORY—American Can Co., Terre Haute, Ind. and 250 Park Ave., New York, 3 story, basement, 180 x 350 ft., rein.-con., brick, separate contract; heating and ventilating, to Wissel & Christman, Terre Haute; electrical work, to Hatfield Electric Co., 102 South Meridian St. Est. $1,000,000. Noted July 24.

**La., Harvey** — FACTORY — Penick & Ford Ltd., Harvey, 117 x 117 ft., brick, steel, hollow tile factory, also brick, hollow tile, steel cold storage plant, 34 ft. high, pile found., to Geo. J. Glover Co., Inc., Whitney Blk., New Orleans, $50,000.

**Me., Peru**—FACTORY—Berst-Forster Dixfield Co., 1 story, 100 x 146 ft., brick, separate contracts. $40,000. Private plans.

**Mass., Springfield**—COAL HANDLING PLANT—McClintock & Craig, engrs., 458 Bridge St., steel and concrete, to Adams & Ruxton, 1387 Main St., for United Electric Light Co., State St. Est. exceeds $40,000. Noted Sept. 11.

**O., Cincinnati**—FACTORY—Boye & Emmes Machine Tool Co., 2245 Spring Grove Ave., 1 story, 120 x 260 ft., brick, steel, factory, Caldwell Dr., to Austin Co., 16112 Euclid Ave. $75,000.

**O., Cleveland** — FACTORY — Cleveland Steel Products Co., 7300 Madison Ave., 1 story, 78 x 190 ft., brick, steel, to H. E. Klefman Co., 2844 Lorain Ave. Est. $40,000. Noted Sept. 4.

**O., Hartwell** — FACTORY — Boye-Emmes Machine Tool Co., Spring Grove Ave., 1 story, brick, Hartwell St., to Austin Co., Dixie Terminal, Cincinnati, $60,000.

**Pa., Pittsburgh**—MILL—Jones & Laughlin Steel Co., 3rd and Ross Sts., 1 story, 16 x 47 ft., brick, steel, 34th St., to Morgan Constr. Co., 15 Belmont St., Worcester, Mass.

**R. I., East Providence** (br. Providence)—ENGRAVING SHOP—Sayles Finishing Co., Phillipsdale, 2 story, timber, to Central Eng. & Constr. Co., 210 Main St., Pawtucket. Est. $40,000.

**R. I., Providence**—BULK STATION—Texas Co., 31 St. James Ave., Boston, Mass., bulk station, Eddy St., to Tucker Constr. Co., Turks Head Bldg. Est. $25,000. Noted Sept. 11, under "Factories and Mills."

**Ont., Guelph**—GAS PLANT—Light & Heat Comn., J. Heeg, mgr., civic gas plant, to West Gas Impvt. Co., 441 Lexington Ave., New York, $107,000.

**Ont., Hamilton**—FACTORY—Norton Co. of Canada, Ltd., 3 Beach Rd., 3 story, 50 x 50 ft., brick addition, to W. H. Cooper, 42 James St. N.

**Ont., Ottawa**—DAIRY—Clarks Dairy, Ltd., Bronson Ave., brick, to Fryer & Pout, 21 Euclid St., $50,000. Noted July 17.

## GARAGES

PROPOSED WORK

**Calif., Oakland**—Drayage Serv. Corp., 1640 18th St., sketches brick, concrete terminal depot. $150,000.

**Ind., Auburn**—Hoff Motor Co., 2 story, 32 x 70 ft. super-service station, brick, steel, hollow tile. $50,000. Private plans.

**Ind., Harlan** — Standard Oil Co., South Bend brick, steel service station, Main St. $40,000. Private plans.

**N. Y., Brooklyn**—J. F. McKenna, 58 Van Dyke St., bids in November, service garage, Columbia and Creamer Sts. $60,000. H. F. McLaughlin, 153 West 97th St., archt. Noted May 15.

**N. Y., Brooklyn**—St. Johns Corp., 1350 Bway., New York, service garage, 281 Albany Ave. $150,000. **Maturity after Jan. 1.** S. Pelton, 110 West 42nd St., New York, archt.

**N. Y., Flushing**—Brein Holding Corp., 247 Langford Ave., Jamaica, sketches by W. Hohauser, Jamaica, 2 story, 125 x 192 ft. service garage, 40th Rd. and Main St. To exceed $45,000.

**N. Y., New York** — Forty-Four West 66th Street Corp., c/o Bloch & Hesse, archts., 18 East 41st St., bids late in October, general and separate contracts, 2 story service garage, 44 West 66th St. $150,000. Noted Apr. 24.

**N. Y., New York**—M. M. Luedke, Hawthorne, sketches by C. Schaeffer, Jr., 332 East 149th St., service garage, 65 West 99th St. $70,000.

**N. Y., Winfield**—S. Shanck, 26 Court St., Brooklyn, plans by B. Sackheim, 26 Court St., Brooklyn, altering and constructing 30 x 275 ft. service garage addition. $50,000.

**Pa., Washington** — G. Woodward (Dodge Autos), 426 East Wheeling St., sketches 2 story, basement, 75 x 135 ft., brick, East Maiden St. $40,000. Private plans.

**Ont. Hamilton**—City, plans civic machine and repair shops, $70,000 incl. equipment. A. McFaul, city engr.

**N. Y., New York**—See "Contracts Awarded."

**Mass., Everett** — Merrimac Chemical Co., Chemical Lane, taking bids 1 story, concrete, steel garage, concrete found., Chemical Lane. $40,000 or more. Private plans.

**Mass., Pittsfield**—Sept. 26, by J. E. Aubry, 41 Pollock St., 3 story, 110 x 130 ft., brick, steel, concrete, Summer St. $140,000. G. E. Haynes, 29 George St., archt.

CONTRACTS AWARDED

**Ia., Sioux City**—Interstate Transit Co., c/o A. Wells, pres., 1924 Webster St., Omaha, Neb., 2 story, basement, 104 x 150 ft., rein.-con., brick, Bedford stone, plain found., 5th and Douglas Sts., to W. A. Klinger, Inc., Warnock Bldg. Est. $125,000.

**Ky., Louisville**—See "Residential."

**Md., Baltimore** — City Baking Co., 308-324 North Gay St., 1 story, 105 x 207 ft. vehicle storage and loading room, automobile repair shop, office, packing floor and stable building, 4128 Hayward Ave., to Consolidated Eng. Co., 20 East Franklin St.

**N. Y., New York**—Six Hundred Thirty West 55th Street Corp., M. Natanson, pres., 527 5th Ave., 6 story, basement, 100 x 200 ft. service garage, factory, 630 West 55th St., separate contracts. $400,000. F. S. Parker, 119 West 57th St., archt. Noted Sept. 11.

**Pa., Wilkinsburg**—Henry Pittsburgh Co., 1121 Penn Ave., 2 story, basement, 66 x 115 ft., brick, steel garage, sales, Penn and Montier Sts., to Lambert & Young, Center Ave.

## POWER PLANTS

PROPOSED WORK

**Calif., Pasadena**—City Director returned bids unopened, furnishing, installing boiler for power plant, due to awaiting decision in suit of Consolidated Steel Corp. Noted Aug. 28.

**Mich., Wyandotte**—City, 2 story, brick, steel, rein.-con. power house, plain found., Van Alstyne Blvd. $300,000. Froelich & Emery, Second Natl. Bank Bldg., Toledo, O., engrs.

**N. J., Jersey City**—Bd. City Comrs., City Hall, rejected bids Sept. 9, power house addition, laundry and tunnels, Baldwin and Montgomery Sts. J. T. Rowland, Jr., 30 Journal Sq., archt. Noted Sept. 11.

**Pa., Neville Island**—E. B. Lee, archt., Chamber of Commerce Bldg., Pittsburgh, soon lets contract brick boiler plant, for Gulf Refining Co., Frick Bldg. Annex, Pittsburgh.

BIDS ASKED

**Mass., South Weymouth**—Weymouth Light & Power Co., 1371 Commercial St., Weymouth, taking bids 1 story, brick, rein.-con., steel substation, concrete found. $40,000. E. J. Berry, 13 Temple St., Quincy, archt.

CONTRACTS AWARDED

**Kan., Leavenworth**—St. Mary's Academy, c/o Sisters of Charity, 1 story, smoke stack 155 ft. high, rein.-con., brick, day labor under supervision M. Carroll & C. E. Dean, archts., 713 Linwood Blvd., Kansas City, Mo.

**Mass., Dighton**—Anchor Color & Gum Wks., brick, steel, concrete power unit, to T. I. Ellis, 20 Alfred Stone Rd., Providence, R. I. Est. $42,000. Noted Sept. 4.

**Mass., Waltham**—See "Schools."

**New Jersey**—See "Bridges."

**N. Y., New York**—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., constructing sub-station 11, West 134th St., to Miller-Blyth, Inc., 441 Lexington Ave., sub-station 12, West 66th St., to Aronberg-Fried Co., Inc., 21 East 40th St.

**N. C., Wilson**—City, brick, terra cotta, steel addition to power plant, to Beaman & Coleman Constr. Co., Lawyers Bldg., Raleigh, $46,850.

## SHOPS AND FOUNDRIES

PROPOSED WORK

**Pa., Bloomsburg**—SHOPS—American Car & Fdry. Co., 30 Church St., New York, rebuilding electrical shop, general construction shop, machine shop, blacksmith shop, storehouse and pattern shop recently destroyed by fire. To exceed $500,000. Private plans. **Maturity indefinite.**

CONTRACTS AWARDED

**Mass., Brighton** (sta. Boston) — MACHINE SHOP—Boston & Albany R.R. Co., South Station, altering 2 story, brick, Beacon Park Yard, to J. F. Fitzgerald Constr. Co., 38 Chauncy St., Boston. Est. $50,000.

**N. J., Fort Lee**—MACHINE SHOP AND SHIPPING DEPARTMENT—Consolidated Film Industries, Inc., Lemoine Ave., general contract 1 story, basement, 25 x 240 ft. machine shop, and 1 story, 25 x 200 ft. shipping department building, to R. J. Walsh & Co., Inc., 420 Lexington Ave., New York. Est. $75,000. Noted Aug. 7.

**Pa., Pittsburgh**—WAGON SHOP—K. Simon, 160 Fullerton St., 2 story, basement, 45 x 65 ft., brick, steel, hollow tile, 160 Fullerton St., to H. Dunn, 1014 Locust St. Est. $40,000.

## WAREHOUSES

PROPOSED WORK

**Fla., Winter Haven** — D. H. Gilbert, Monticello, 1 story, 80 x 100 ft., rein.-con. warehouse. $50,000.

**Mass., Malden** (br. Boston)—Malden Electric Co., 157 Pleasant St., J. T. Day, mgr., warehouse, distributing station, laboratory, Centre St. $50,000 or more. Private plans.

**N. Y., Brooklyn**—MacAdam & Foster, Inc., 107 Lexington Ave., New York, plans by T. A. Pierce, 419 4th Ave., New York, 3 story, 50 x 100 ft., industrial storage, Lexington and Classon Aves. To exceed $40,000.

**N. Y., New York** —A. J. C. Corp., A. J. Chesley, pres., plans by P. J. Murry, 14 West 45th St., 100 x 100 ft. industrial storage, Austin Pl. and 144th St. $50,000.

**N. Y., New York**—Spear & Co., 575 6th Ave., plans by L. Davidson, c/o owner, 10 story, 100 x 145 ft. storage, 524 West 23rd St. $500,000.

**Pa., Phila.** — Wheeling Corrugating Co., Wheeling, W. Va., sketches 1 story, 250 x 265 ft., brick, steel, plain found., 3rd St. and Hunting Park Ave. Private plans.

**Tex., San Antonio**—Cleveland Tractor Co., c/o J. W. Francis, Cleveland and 1113 West Houston St., purchased 6.48 acre site and plan sales and warehouse building, South Cherry St. and Missouri, Kansas and Texas R.R tracks.

**Va., Altavista**—Lane Co. rebuilding 3 story, 100 x 120 ft., brick warehouse, recently destroyed by fire. Lockwood Greene Engineers, Inc., 100 East 42nd St., New York, engrs.

BIDS ASKED

**N. Y., New York** — Seventh Avenue and Thirtieth Street Corp., L. Kleban, pres., 1440 Bway., taking bids on separate contracts storage, bank, office, 361 7th Ave. $300,000. E. Roth, 1440 Bway., archt.

**N. Y., New York**—G. and E. Blum, archts., 415 Lexington Ave., taking bids general contract 4 story storage, 1220 Bway., for Shire Realty Co., L. Shulsky, pres., 26 Court St., Brooklyn. $150,000.

CONTRACTS AWARDED

**N. J., Paterson**—Pub. Serv. Electric & Gas Co., 80 Park Pl., Newark, general contract 1 story, 98 x 235 ft., brick, steel, plain found., Prospect and Van Houten Sts., to United Engineers & Constructors, Inc., 870 Main Ave., Passaic. $100,000.

**N. Y., New York**—Furland, Inc., A. A. Bernstein, pres., 224 East 50th St., storage, stores, to Magoba Constr. Co., 271 Madison Ave. Est. $150,000. Noted May 22.

*See proposal advertising on page 107*

*Constr. News page 133*

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## *The* PIVOT CONVEYOR

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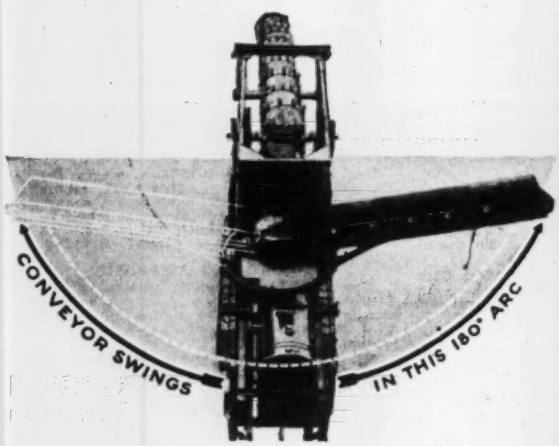

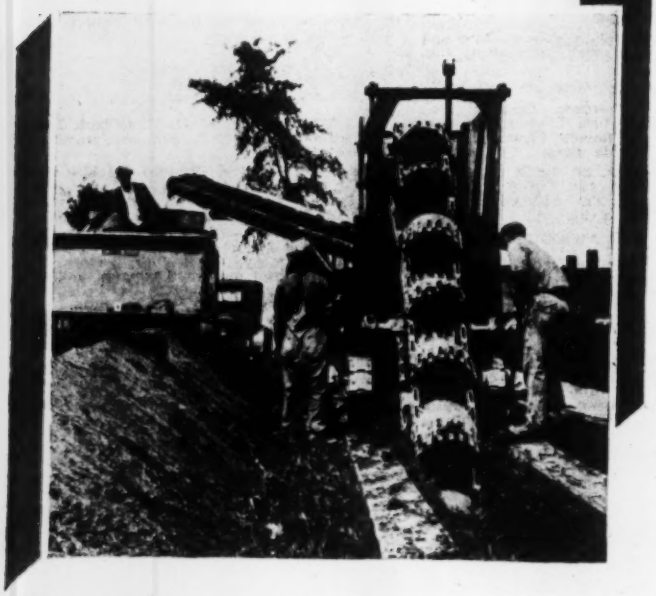

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